AD-A052 001 FEDERAL AVIATION ADMINISTRATION WASHINGTON D C SYSTE--ETC F/G 1/5
MASTER PLAN: FLIGHT SERVICE STATION AUTOMATION PROGRAM.(U)
JAN 78

UNCLASSIFIED FAA/RD-FSS-01A NL

1 OF 1
AD A
052001

END
DATE
FILMED
4 -78
DDC

FSS-01A

MASTER PLAN

FLIGHT SERVICE STATION AUTOMATION PROGRAM

JANUARY 1978

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Systems Research and Development Service
Washington, D.C. 20590

NOTICE

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States government assumes no liability for its contents or use thereof.

(14)

FAA/RD-FSS-01A

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.

4. Title and Subtitle	5. Report Date
(6) Master Plan, Flight Service Station Automation Program.	(11) January 1978
	6. Performing Organization Code
	8. Performing Organization Report No. (12) 83 p.
7. Author(s)	
9. Performing Organization Name and Address Department of Transportation Federal Aviation Administration Systems Research and Development Service Washington, D. C. 20590	10. Work Unit No. (TRAIS) 11. Contract or Grant No. 13. Type of Report and Period Covered Master Plan
12. Sponsoring Agency Name and Address Department of Transportation Federal Aviation Administration Systems Research and Development Service Washington, D. C. 20590	14. Sponsoring Agency Code ARD-404

15. Supplementary Notes

16. Abstract

The Master Plan for the Flight Service Automation Program is a planning document for the implementation of the Flight Service Information System and serves as the acquisition authorization document. This document contains background and introductory information relating to the present system of 292 manned domestic Flight Service Stations, program objectives, requirements, planning guidelines, systems and system interface descriptions, scheduling and implementation information, relationships with other major programs, management method, logistics, staffing, training, security, and financial planning information.

17. Key Words	18. Distribution Statement
Flight Service Stations Automation	Document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	81	

TC

340 170

This Master Plan was prepared by a team including representatives of the following organizations:

Systems Research and Development Service

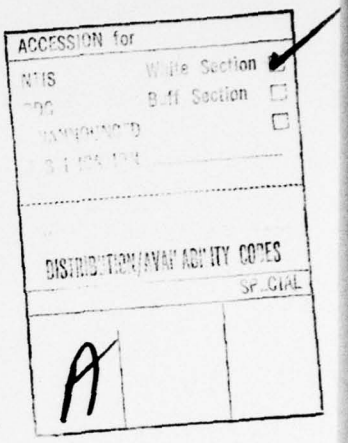
Air Traffic Service

Airway Facilities Service

Logistics Service

Office of Budget

Office of Personnel and Training



This document provides a plan for the implementation of the Flight Service Station Automation Program and serves as the acquisition authorization document required by agency Order 1810.1, Systems Acquisition Management.

This acquisition covers Phases A and B of the Master Plan, the complete implementation of Flight Service Station Automation for Level III Flight Service Stations and implementation of pilot self-service. This is the sole program addressing automation of Flight Service Stations.

Implementation beyond the above will be subject to future review and acquisition authorization.

APPROVED: Langhorne Bond
ADMINISTRATOR

DATE: JAN 19

FOREWORD

A Master Plan for the Flight Service Station Automation Program was circulated for coordination in September, 1977. The comments from that coordination have been incorporated in this issue of the Master Plan. One significant change noted in this issue is the implementation of automation ahead of the consolidation of Flight Service Stations into 20 Hub facilities.

The program to automate the Flight Service Stations, as documented in this Master Plan, is to provide a national computer-based Flight Service Information System. Direct access will be provided the FAA Flight Service Station Specialists to improve the timeliness and quality of briefings and flight plan handling. Direct access will also be provided the users so that in time they will be able to satisfy 70 per cent of their needs without the assistance of a specialist. In this way, automation is to become the means for the system to satisfy the service demand growth without an increase in system work force.

The implementation plan described in this document is to automate at least 43 of the most active Flight Service Stations followed by collocation and consolidation of the present domestic 292 Flight Service Stations into 20 new Hub facilities at the 20 Air Route Traffic Control Center (ARTCC) locations. However, the potential difficulties of consolidation have resulted in the development of an alternate plan. The alternate plan will meet system demands without consolidation, but with automation extended from 43 up to maximum of 150 Flight Service Stations in the same time frame as described for the total consolidation plan. It is emphasized that 150 is the upper limit on the ultimate configuration for costing purposes and is not the selected alternate configuration. This alternative does not require, nor preclude, the closing and/or consolidation of the remaining 142 manual Flight Service Stations. The issue of consolidation will remain under consideration and a decision will be made prior to 1983 concerning which plan will be followed.

For either plan, approximately 1200 specialist display consoles will be required. In the 20 Hub plan, all equipment, displays and specialists will be located in the Hub facilities at the ARTCCs; whereas, in the alternate plan the displays and specialists would be located in up to 150 Flight Service Stations. In both plans, the major computer system will be in the 20 existing ARTCCs.

The implementation approach and cost for both plans are almost identical for the first five years of the program (through 1982). Consequently the consolidation decision can be delayed without affecting program costs.

This document contains cost estimates beyond 1982 to reflect the 20 Hub consolidation plan. The alternate plan is not described or costed beyond 1982. An addendum is being prepared to describe the alternate plan. It will become a supplement to the Master Plan when it has been coordinated and approved within the FAA.

This document is a long range planning tool. At this point in time, automation will be limited to the Level III FSSs and implementation of pilot self-service. Pending validation of the benefits gained from this first step, further automation will not be programmed nor authorized.

TABLE OF CONTENTS

FIGURES

TABLES

EXECUTIVE SUMMARY

As addressed in this Master Plan, the Master Plan of June 1976 and the OST/FAA Study of 1973, the objective of the Flight Service Station Automation Program is to meet the present and projected long-term demand for flight services without a proportional increase in staff and commensurate operating costs. This will be accomplished by extensive use of automation and the concept of self-briefing whereby the users can access the system directly to obtain a weather briefing or file a flight plan.

At this time, approval to implement the program is limited to Phases A and B of the Master Plan--automation for the Level III FSSs and implementation of pilot self-service.

The Master Plan has been in preparation through the past year and reflects system costing based on multi-year funding and 1977 prices. The cost of Phases A and B is to be limited to $140 million based on the following:

1. Full funding of the program in FY 79 will permit large quantity buying of materials with associated discounts.

2. Sharp competition in the data processing industry and further progress in the state-of-the-art continues to yield greater data processing capability at lower prices to the buyer.

3. A design to cost approach will be used to supplement the results of 1 and 2 above.

A procurement request will be initiated in early 1978 for the competitive procurement of computer systems to be located at 14 Air Route Traffic Control Centers (ARTCCs) which will drive specialist terminals in at least 43 of the busiest Flight Service Stations across the country. These systems will be in place starting in late 1980 and will be fully operational starting in mid-1981. These systems will subsequently be upgraded with additional data processing hardware and functional operating capabilities in the 14 ARTCCs. The upgraded systems will also be installed at a later date at the remaining 6 ARTCCs. This will provide the necessary automation capacity to meet forecasted service demands through 1995 for all specialist operating positions and for self-briefing features for pilots throughout the country.

With the present phased approach for automating Flight Service Stations, a decision does not have to be made now on the consolidation of Flight Service Stations or on the initiation of building programs for Flight Service Hubs. This decision may be made at any time between the present time and the 1982-83 time frame. With the present approach, the centralization of processors within the ARTCCs results in continued

use of the initially procured equipment regardless of the final decision on the consolidation issue. Implementation of direct user access and pilot self-service will be accomplished as soon as possible without regard to the resolution of the consolidation issue.

While the major objective of this program is to meet an increasing demand for flight services without a proportional increase in staff, there are other results expected. The users will receive more timely and higher quality flight information service. The Government will benefit through more efficient operations and a gradual reduction in manpower as the users begin to brief themselves by means of direct access features. Substantial reduction in annual operating cost will accrue in the future compared to an expansion of the present system with its inefficient methods.

1.0 INTRODUCTION

1.1 GENERAL

During recent years, concern has developed in regard to the future of the present Flight Service Station System. This concern was prompted by a number of considerations:

- o High cost of operating the present, predominately manual system;
- o Higher costs of the system if expanded to satisfy the growing demand for flight services in the future;
- o Attendant derogation of safety to be expected from a lesser expansion of system capacity;
- o Growing need to improve the overall availability and quality of services being provided to the general aviation community.

A number of studies have addressed this concern. The OST/FAA study, "A Proposal for the Future of Flight Service Stations," published in August 1973, proposed a new system concept: an automated system concept consisting of a Central Processing Facility, Hub Stations and Self-Service Stations which would serve as the primary contact between the system and its users. This proposed concept would satisfy the need for increasing the quantity and quality of services and provide the means to meet demands of projected growth while operating at a significantly reduced cost per service.

In June 1976, a Master Plan was prepared by the FAA for review and comment by DOT offices, other government agencies, user groups, labor groups and industry. The primary features of that plan evolved from the concept presented in the OST/FAA study and represented interim guidance within the agency for system automation. The primary goals were:

- o Immediate improvements to existing facilities and operations;
- o Development and implementation of automation to improve flight service system performance;
- o Reconfiguration/consolidation;
- o Automation capabilities for direct user access to aviation weather and flight data products.

These goals remain unchanged. The plan has been revised to include an early phase of automation in the Level III Flight Service Stations and to employ the use of distributed processing systems.

Implementation of the Flight Service Hub portion of the Flight Service Station Automation Program will be reviewed in the 1982-83 time period.

1.2 Purpose and Scope of the Master Plan

The purpose of this document is to present the policy, guidelines and plan for implementing the FSS Automation Program. Although at this time the plan addresses both total consolidation into Hubs and alternatively the automation of up to 150 FSSs, implementation will be limited to automation of Level III FSSs, the establishment of 20 computer systems(1 per ARTCC) and implementation of pilot self service.

1.3 Present System

The FAA currently maintains a system of 292 manned domestic Flight Service Stations within the conterminous United States. This system is designed to provide a broad spectrum of services which are needed to support: the air traffic control and air navigation systems; the users of the National Airspace System; and to provide safety and efficiency in aviation.

The Flight Service Station is an operational air traffic facility providing services to pilots operating under Instrument Flight Rules and Visual Flight Rules. The primary functions directly relate to National Airspace System support and aviation weather acquisition and dissemination. Each facility is assigned responsibility for a specified flight service area encompassing numerous airports and navigational aids.

Flight Service Stations act as the backbone of the flight information system. The Flight Service Stations process over 56 percent of Instrument Flight Rules flight plans filed into the National Airspace System; operate the entire Visual Flight Rules flight plan program; are a major data source for the National Flight Data Center, and originate Notices to Airmen concerning the operational status of airports, navigation aids, communications outlets and facilities.

Additionally, Flight Service Stations are one of the main focal points for aviation weather data acquisition and dissemination. Surface weather observiations are taken at over 200 existing locations. Observation data is distributed to processors and directly to users on a national telecommunications system. Processed data, such as National Oceanic and Atmospheric Administration forecasts, are relayed to aeronautical users via the same national telecommunications system.

Pilot briefing services are provided in all phases of flight. In 1976 Flight Service Station Specialists provided 16 million briefings. Preflight briefings are conducted both in person and by telephone to satisfy the needs of the individual pilot. These briefings provide the pilot with the latest information regarding weather, general flying conditions and the status of airspace and navigational facilities along the planned route of flight. When actual or forecast weather conditions indicate that Visual Flight Rules flight conditions are doubtful, Flight Service Specialists recommend against flight under Visual Flight Rules. On extended flights, other Flight Service Stations may be contacted by radio to obtain further information. Area and/or route-oriented briefings are provided in some locations by Transcribed Weather Broadcast and Pilot Automatic Telephone Weather Answering Service.

The Flight Service Station communications capability has continued to be of importance in maintaining safety in the National Airspace System. Inflight briefings are conducted as a matter of routine. Traffic control information is relayed to aircraft unable to contact an Air Route Traffic Control Center (ARTCC), flight assistance is provided to lost or disoriented pilots, and airport advisories are provided at those airports where no tower services are available. These services benefit all the various users of the system.

Additional responsibilities specifically assigned to the Flight Service Stations include flight following of aircraft flying under Visual Flight Rules in mountain, lake, and swamp areas, En Route Flight Advisory Service and coordination of search and rescue operations.

1.4 Statement of the Problem

The existing system has a multitude of problems. These are:

1. Current unmet demand expected to increase in the future;
2. Highly labor intensive, manual system operation;
3. Basic geographic configuration of stations no longer patterns of greatest general aviation activity;
4. Functions poorly organized within and among stations;
5. Equipment costly to maintain.

The number of flight services provided in 1976 by the domestic Flight Service Stations was 55 million. Extended forecasts predict that those total flight services will increase to 142 million by 1995. While this demand for service is steadily increasing, the current system is not able to meet the present demand. The total system staffing has been held virtually constant over the last several years.

Present system operations use manual manipulation of teletypewriter paper which is cut, sorted, and inserted into clip boards from which pilot briefings are given. When requests for information are received, the specialist is required to thumb through the myriad of paper to find the data he needs. Flight plan entry messages are accomplished in a similar manner. A paper tape is manually prepared and entered into the low speed teletypewriter communications system. These procedures, constrained as they are by the equipment with which the specialist is required to work, lend themselves to extremely inefficient performance of the flight service functions.

The basic geographic configuration of stations is along historically significant routes which are no longer the patterns of greatest general aviation activity. As a consequence of geographical location, there are wide disparities in the size and productivity of individual stations. Much of the equipment now in use is costly to maintain and improvement have been hampered due to physical limitations of available space.

1.5 Approach to Problem Resolution

The approach is to apply automation techniques to satisfy both current and future user demands, and to offset the projected increased operational cost of the manual system. However, the magnitude and complexity of automation improvements, if totally implemented at one time, would cause a rapid and radical change in system operations. Therefore, an incremental approach for automating the system has been adopted.

The approach is:

Under this program:

- Provide early deployment/implementation of Model 1 System (limited specialist automation) of the most active Flight Service Stations.
- Provide Model 2 System with expanded specialist automation capability at the most active Flight Service Stations.
- Broaden the automation capability to provide for direct user access to aviation weather and flight data products.
- Subject to a future decision, establish automated Flight Service Hubs and gradually consolidate existing Flight Service Stations or continue to expand specialist automation to additional Flight Service Stations.
- Provide manpower adjustment and training plans for automation system transition and operation.

- Provide automation system maintenance plans and requirements for optimized system performance and staffing.

- Provide a review of ongoing FSS Program subsystem replacements, improvements and procurements to promote compatibility with the automation of FSS functions.

Under other programs:

- Continue to provide improvements to existing facilities and operations.

- Continue improvements in mass weather dissemination system capacity, accessibility and usability.

1.6 Cost Benefit Analysis

To compare cost savings of the Automated Flight Service System with the cost of operating the present system of 292 FSSs (with anticipated improvements) through 1995, a cost benefit study was performed. As a valid comparison, both alternatives were sized, staffed, equipped, and costed to meet forecast demands for flight services in the 1977-1995 time frame. The cost benefit study is currently being updated to reflect recent changes in the FSS automation approach and will be available for reference as a separate document.

Program costs for the planned Flight Service Station Automation Program presented in this plan (Section 12, Financial) are estimated using the planned staffing level constraint contained in Section 9, Staffing.

1.7 Site Evaluation

In order to insure that FAA's equal opportunity policies are adhered to, any relocation that takes place as a result of implementation of this plan will be done in accordance with the civil rights provisions required by FAA Order 1100.120A, Facility Acquisition, Expansion and Relocation.

2.0 PROGRAM OBJECTIVES AND REQUIREMENTS

2.1 Program Objectives

The objective of the program is to implement system improvements which will adequately meet forecast user demand at a minimal cost per service. The OST/FAA study and the contents of this plan support this objective. Achievement of this objective will be accomplished through the application of centralized data processing facilities, automation, direct user access and improved/expanded mass weather dissemination.

2.2 Functional Requirements

The current system performs a multitude of functions. These functions were subjected to critical analyses and reviews as part of the OST/FAA study to determine those functions necessary and appropriate for the Flight Service System. The results of this analysis were confirmed by a joint FAA service group in December 1974 and modified slightly in a subsequent review. Action to transfer or eliminate certain functions has already been taken and activities to consider other recommendations will be initiated/continued as the program progresses. The functional requirements for the Automated Flight Service Station System are:

- Emergency Assistance
- En Route Flight Advisory Service
- En Route Communications
- Pilot Briefings
- Flight Plan Servicing
- Notice to Airmen Processing

Functions currently performed but identified for transfer or elimination are:

- Airport Advisory Service
- Airmen Examinations
- Surface Weather Observations
- Military Flight Service
- Navigational Aid Monitoring

The status of action to accomplish the transfer/elimination of these functions is as follows:

- o Eliminate Airport Advisory Service - Airport Advisory Service will remain virtually unchanged until those Flight Service Stations currently providing the service are decommissioned or reduced in hours of operation. FAA Advisory Circular 90-42A, Traffic Advisory Practices at Non Tower Airports, establishes recommended procedures for such locations.

- o Eliminate Administration of Airman Examinations at Flight Service Stations - The number of stations which administer airman exams has been reduced significantly. FAA regional directors are to continue to reduce the number of air traffic facilities authorized to provide airman written test services in accordance with guidelines contained in FAA Order 8440.4C, Written Test Services at Flight Service Stations.

- o Transfer Surface Weather Observations - As existing stations are part-timed and/or decommissioned, this function will be transferred to control towers, the National Weather Service, contract observers, or operational automated units, as appropriate at each location. The quality of service will be maintained.

- o Transfer of Military Flight Service - The present plan is to provide selected military locations telecommunications access to appropriate FAA facilities. The details associated with this interface will be established in the near future. Planning and coordination between Department of Transportation and Department of Defense are currently underway to develop a mutually acceptable approach.

- o Transfer Navigational Aid Monitoring - Monitoring and control of Navigational Aids will be accomplished automatically within the System Maintenance Subsystem, and selected status indicators will be automatically directed to appropriate positions within the Hub facility.

3.0 PROGRAM PLANNING

3.1 Ongoing Programs

Improvements to the existing system have been essential. The En Route Flight Advisory Service Program is nearing final implementation on a national basis. Improvements to the Transcribed Weather Broadcast and Pilot Automatic Telephone Weather Answering Service systems and closed circuit television display systems for internal data and graphics products distribution are now being deployed. Telephone recording systems for flight plan filing service (Fast-File) have been leased. Telecommunications services have been upgraded via the addition of more dedicated circuits.

Medium Speed Data Terminal Equipment will be provided at higher activity Flight Service Stations for replacement of electromechanical equipment.

3.2 Flight Service Station Automation Program Phases

A 4-phase program is planned to develop, acquire and implement the Flight Service Station Automation Program. The basic content of each program phase is described below and is outlined in Table 3-1. Implementation of an incrementally improved automation system for Level III Flight Service Stations will be accomplished in Phases A and B. During Phase B a plan for Flight Service Hubs collocated with Air Route Traffic Control Centers will be reassessed. Given a decision to proceed, engineering designs will be completed for the building program and the Radio Communications Control System. Collocation and consolidation of Flight Service Stations, if directed, will begin in Phase C, and will be completed in Phase D. The automation systems to be implemented are designated Models 1 and 2 and the enhancements, Model 3. A description is contained in Section 4.

3.2.1 Phase A

In Phase A, contracts will be awarded for the design and development of the Model 1 and Model 2 Systems. Up to 3 contractors will be selected to compete in Model 2 design verification. Model 1 application software will be developed during the Model 2 design verification. process.

A single contractor from the aforementioned group will be selected for production of all Model 1 and Model 2 Systems. Phase A will include the Model 1 Systems and the first Model 2 System. Fourteen Model 1 Flight Service Data Processing Systems will be deployed, using existing space, at domestic Air Route Traffic Control Center locations. In addition, Model 1 Systems will be provided to NAFEC and the Academy. Specialist display consoles using Data Terminal Equipment will be established at domestic Level III Automated Flight Service Stations.

TABLE 3-1

FLIGHT SERVICE STATION AUTOMATION PROGRAM PLAN

PHASE A

ACQUIRE/DEPLOY MODEL 1 SYSTEMS

INITIATE DEVELOPMENT OF MODEL 3 ENHANCEMENT/DEPLOY AS AVAILABLE

PHASE B

ACQUIRE/DEPLOY MODEL 2 SYSTEMS

CONFIRM CONSOLIDATION DECISION

ACQUIRE/DEPLOY MODEL 3 AUTOMATION ENHANCEMENTS

ARCHITECT AND ENGINEERING FLIGHT SERVICE HUB BUILDING DESIGN

INITIATE DEVELOPMENT OF FLIGHT SERVICE HUB RADIO COMMUNICATIONS CONTROL SYSTEM

PHASE C

BEGIN FLIGHT SERVICE HUB BUILDING CONSTRUCTION

ACQUIRE/DEPLOY FLIGHT SERVICE HUB RADIO COMMUNICATIONS CONTROL SYSTEMS

BEGIN CONSOLIDATION

PHASE D

COMPLETE CONSOLIDATION INTO 20 FLIGHT SERVICE HUBS

A separate contract will be awarded for a Voice Response System and other system enhancements identified as Model 3. The Voice Response System will be deployed as soon as possible. The remaining enhancements will follow installation of Model 2.

3.2.2 Phase B

During Phase B, 20 Model 2 Systems will be acquired and deployed. These systems will upgrade the 14 Model 1 Flight Service Data Processing Systems, establish 6 new Flight Service Data Processing Systems at the remaining 6 domestic Air Route Traffic Control Centers, and provide additional display equipment and automation capabilities at specialist positions in the Level III Automated Flight Service Stations. Voice Response Systems and other Model 3 enhancements will be installed as they become available at all Model 2 facilities. In addition, Model 2 Systems will be provided to NAFEC and the Academy.

The decision to consolidate to 20 Flight Service Hub facilities will be reconsidered. Given the decision to consolidate, architectural and engineering designs will be completed for the Flight Service Hub buildings and a Radio Communications Control System will be acquired.

3.2.3 Phase C

Phase C will begin collocation and consolidation of nonautomated Flight Service Stations into the 20 Flight Service Hubs. The Automated Flight Service Stations will remain in their remote locations during this phase.

3.2.4 Phase D

The final phase of the program is directed to completing the consolidation of Flight Service Stations into the 20 Flight Service Hubs. The remote Automated Flight Service Stations will be closed and all specialist services will be provided from the Flight Service Hubs.

NOTE:

The issue of consolidation/collocation will remain under consideration and a decision will be made prior to 1983 concerning the plan to be followed. If the decision is not to consolidate and collocate at the 20 Hubs, the alternate plan is to extend automation to most of the Level II Flight Service Stations, bringing the total number of Automated Flight Service Stations up to a maximum of 150. An addendum covering this alternate plan will be issued.

3.3 Planning Information

This program will generate major acquisitions of building space and automation and communications systems extending over a number of years. Section 5.0 of this document presents the program schedule and contains planning information for systems acquisition, implementation, testing, site preparation and building construction. Key operational transitions required for the Model 2 System are also described.

4.0 SYSTEMS AND SYSTEMS INTERFACE DESCRIPTIONS

4.1 System Descriptions

This section describes the Flight Service Information System and the successive stages of automation to be implemented in each of the program phases. These stages will be designated Models 1,2 and 3. Each, in turn, will provide a progressively improved automation capability as the program proceeds. In addition, related improvements are discussed for purposes of completeness and clarity.

4.1.1 Model 1 System

During Phase A of the program, the Model 1 System will be deployed. Model 1 will consist of a computer system which will be a subset of the system design for the Model 2 System. This system will be deployed at 14 of the present Air Route Traffic Control Center facilities. The Model 1 computers (Flight Service Data Processing System) will drive Data Terminal Equipment located at the present Level III Flight Service Station facilities (Automated Flight Service Stations). The communications interface between the Flight Service Data Processing System and the remote terminals will provide a dedicated as well as a dial-up capability. The software used in this model will be a relatively simple version to permit automatic file updating, retrieval and display of weather and aeronautical data from the data base. Flight plan entry and flight plan processing will be provided.

Dedicated data communications lines from the Weather Message Switching Center to each of the 14 Flight Service Data Processing Systems will provide automatic data base updating and request/reply capability. An interface with the National Airspace Data Interchange Network will be provided for flight movement messages. A block diagram of the Model 1 System is shown in Figure 4-1.

4.1.2 Related Improvements

4.1.2.1 Graphics

All Level III Flight Service Station facilities are being equipped with closed circuit television subsystems for intrastation distribution of graphic products. These closed circuit television systems will be utilized until the Model 2 Systems which provide computer generated graphics, are deployed during Phase B of this program.

4.1.2.2 Mass Weather Dissemination

Mass Weather Dissemination System improvements will also be deployed during Phase A to improve Level III facilities by providing the user a service to select the desired route/sector oriented Pilot Automatic

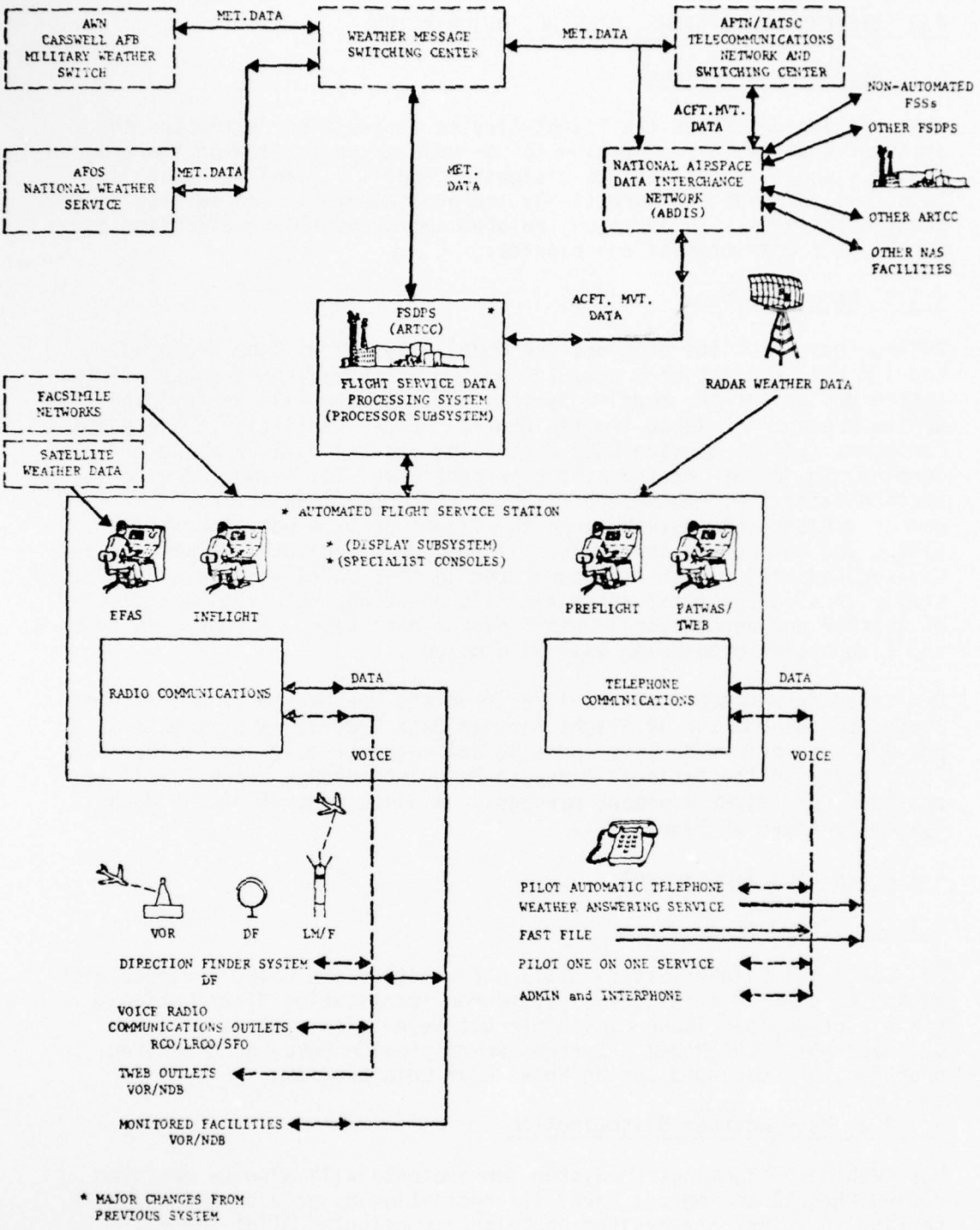


FIGURE 4-1

MODEL 1 SYSTEM BLOCK DIAGRAM
AUTOMATED FLIGHT SERVICE STATIONS

Telephone Weather Answering Service and the Transcribed Weather Broadcast. The Pilot Automatic Telephone Weather Answering Service and Transcribed Weather Broadcast data base updates will be accomplished by manual voice entry. Specialist updating of unique data base segments will minimize operating manpower requirements. The improved systems will automatically structure and format selected messages for Pilot Automatic Telephone Weather Answering Service and continuously cycle messages for Transcribed Weather Broadcast. Multiple outlets will be provided at each facility. Inherent within this same system will be a Fast-File flight plan capability.

4.1.2.3 En Route Flight Advisory Service

En Route Flight Advisory Service (EFAS) is an established national program which provides en route aircraft with timely and meaningful weather advisories. Flight watch specialists are responsible for their advisories and have the responsibility to tailor all available information for specific flights. The Automation Program will provide the necessary automated assistance for the EFAS specialist to input and retrieve necessary data.

4.1.2.4 Weather Radar

National Weather Service radars and Federal Aviation Administration long-range radars will be the source for radar weather data displays at En Route Flight Advisory Service facilities in the same manner as in today's system.

4.1.3 Model 2 System

The Model 2 System including the Aviation Weather Processors will be deployed during Phase B. The Model 2 System will evolve from the Model 1 System. The Model 2 System will also be deployed at the 6 remaining Air Route Traffic Control Centers. The Level III Automated Flight Service Stations will be reconfigured among the 20 Flight Service Data Processing Systems to optimize loading distribution. The Model 2 capabilities of the Automated Flight Service Station, the Aviation Weather Processors and the Flight Service Hubs are as described in the following paragraphs.

4.1.3.1 Model 2 System - Automated Flight Service Stations

The Model 2 System in the Automated Flight Service Station will provide full specialist automation capabilities to replace limited automation introduced in the Model 1 System (see Figure 4-2). The Model 1 Flight Service Data Processing Subsystems installed in Air Route Traffic Control Centers and the Automated Flight Service Stations System will be upgraded to Model 2. The specialist will retrieve weather data and enter flight plans using an alphanumeric/graphic display and associated keyboard. Weather radar data will be received from selected National Weather

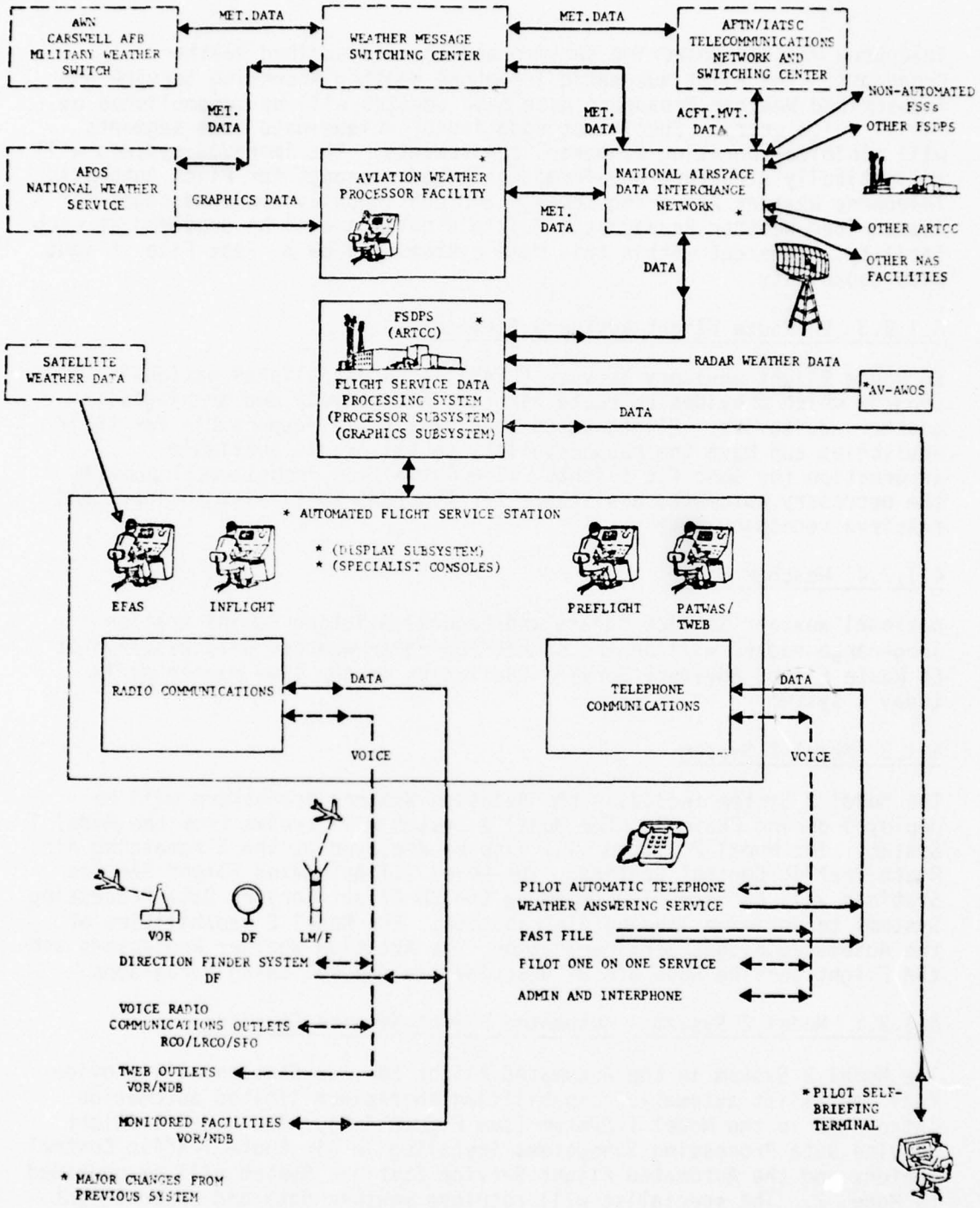


FIGURE 4-2
MODEL 2 SYSTEM BLOCK DIAGRAM
AUTOMATED FLIGHT SERVICE STATIONS

Service/Federal Aviation Administration radars and stored in the Flight Service Data Processing Subsystems for instant retrieval on specialist displays. Weather graphic products generated by the National Weather Service's Automation of Field Operations and Services Program will also be stored in the Flight Service Data Processing System for display at specialist positions. The specialist will have the capability to retrieve specific weather reports as well as detailed route-oriented briefings from the data base, and be able to enter flight plans directly from his keyboard. The Flight Service Data Processing Systems will then forward flight plans to the appropriate facility.

The method of entering military flight plans for complex "stop-over/combination" IFR/VFR flights will be simplified. Weather observations, Notices to Airmen and Pilot Reports will be entered directly into the Flight Service Data Processing System aviation weather and aeronautical data base. Flight Plan "Fast-File" types of access (previously mentioned in paragraph 3.1) will also be provided in this phase of the program.

Standardized data communications interfaces and procedures will be published and maintained to provide an initial capability for users to access the data base from privately owned communication terminals. A pilot using one of these terminals will be able to obtain a weather briefing, enter a Pilot Report, or file, close or cancel a flight plan. Flight plan information from these remote terminals will be routed through the Flight Service Data Processing System and automatically filed with the appropriate facility. This plan anticipates no charges for this service; however, users will absorb terminal and communication costs required for access. Safeguards will be taken to protect the data base security and identify spurious/erroneous entries from these terminals (refer to Section 11.0 Security). The Pilot Automatic Telephone Weather Answering Service in the Model 2 System will contain improved route-oriented text with recorders located in high demand areas. There will be several route directions per area with one recording per direction for each location. The update of Pilot Automatic Telephone Weather Answering Service recordings will be computer prompted but manually edited and recorded by a specialist. Transcribed Weather Broadcast recordings will also contain improved text and will be similarily produced.

4.1.3.2 Aviation Weather Processor - Model 2 and 3 Systems

The function of the Aviation Weather Processor will be to communicate with the Weather Message Switching Center and the National Weather Service's National Meteorological Center, and to process and distribute data to the Flight Service Data Processing Systems in both alphanumeric and graphic form. Aviation Weather Processor edit terminals will be provided for alterations of the data base as required. Data tables will be provided for weather chart generation.

4.1.3.3 Model 2 System - Flight Service Hubs

The Model 2 System in the Flight Service Hubs will provide the same specialist automation capabilities as in the Automated Flight Service Station. The Flight Service Hubs, collocated at Air Route Traffic Control Center sites, will be the operational focal points for a consolidated Flight Service Information System in Program Phases C and D (refer to Figure 4-3). The Flight Service Hub buildings will be constructed to eventually house all personnel relocated from Flight Service Stations and will provide required space for operations. The Flight Service Hub building program is described in Section 5.3.

Specialist services for telephone and air/ground inquiries for weather briefing and flight plan filings will be consolidated at the Flight Service Hubs. Telephone access to the specialists for these services will be provided by a combination of toll-free Wide Area Telecommunications Service and local and/or foreign exchange lines for optimum cost effectiveness.

4.1.4 Model 3 System

The Model 3 System will consist of additions and improvements for pilot self service. Direct user access features will be expanded with additional remote terminal capability. Although the Voice Response System is part of the Model 3 enhancements, this system will be implemented as soon as possible. Other Model 3 enhancements will be predicated on the availability of the Model 2 Systems. See Figures 4-4 and 4-5 for the Automated Flight Service Station and Flight Service Hub configurations. This expansion of both availability and capability of the pilot direct access automation techniques will enable further consolidation of facilities.

4.1.4.1 User System Access Via Telephone

Capability will be provided for pilots to directly access the aviation weather data base utilizing a "touch-tone" type of telephone. This capability will be "interactive" in that the pilot can specifically request various types of information.

This information, such as local weather, route-oriented weather, or selected weather reports, will be retrieved from the Flight Service Data Processing System weather data base and spoken to the pilot by the Voice Response System. Specialist assistance will normally not be required but will be available if needed. Although this "interactive" capability requires a "touch-tone" type of telephone, rotary dial phones augmented with a Dial Tone--Multi Frequency pad or personally-owned terminal devices may be used. Access for this capability will be provided through the use of toll-free telephone service and local and/or foreign exchange

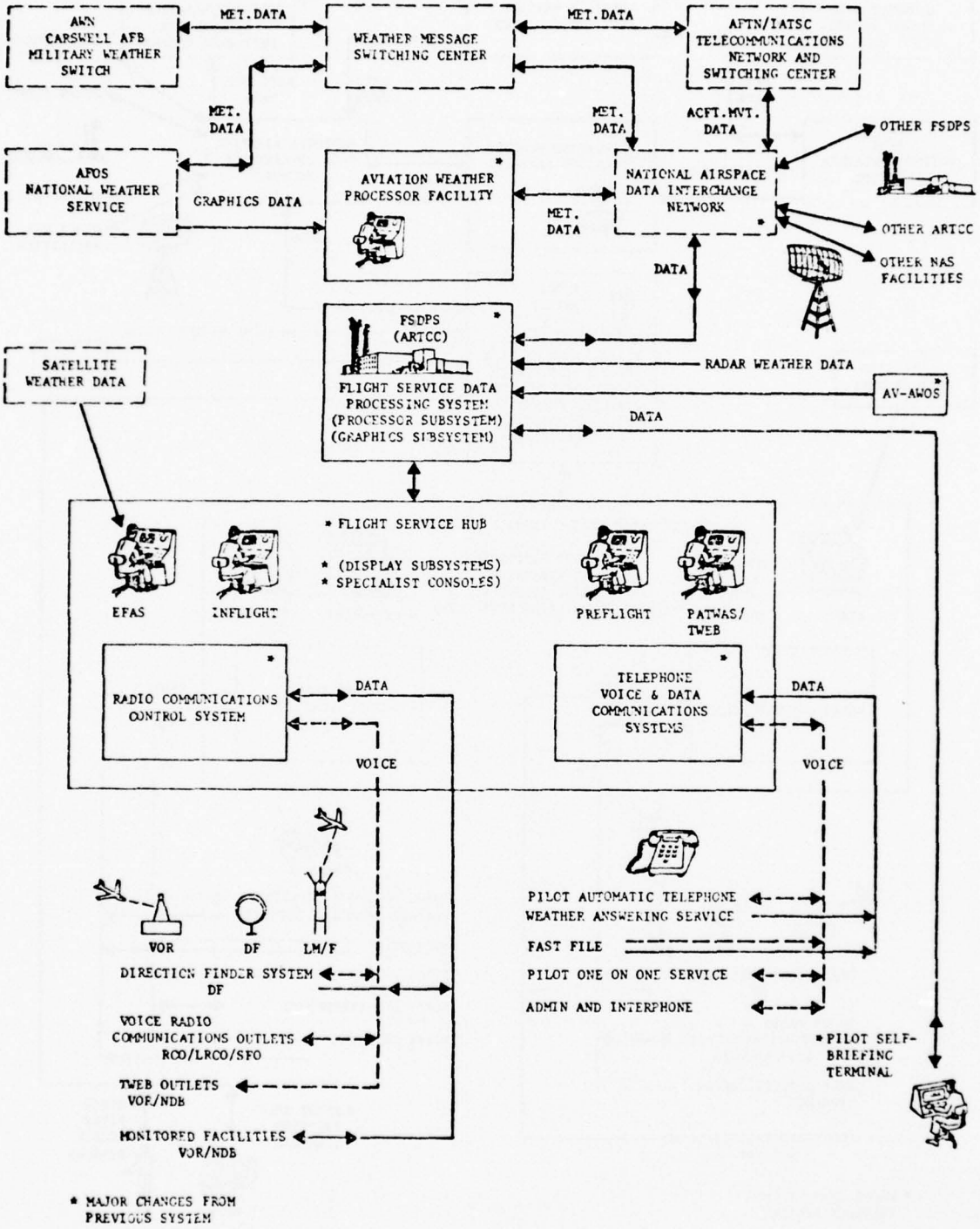


FIGURE 4-3
MODEL 2 SYSTEM BLOCK DIAGRAM
FLIGHT SERVICE HUBS

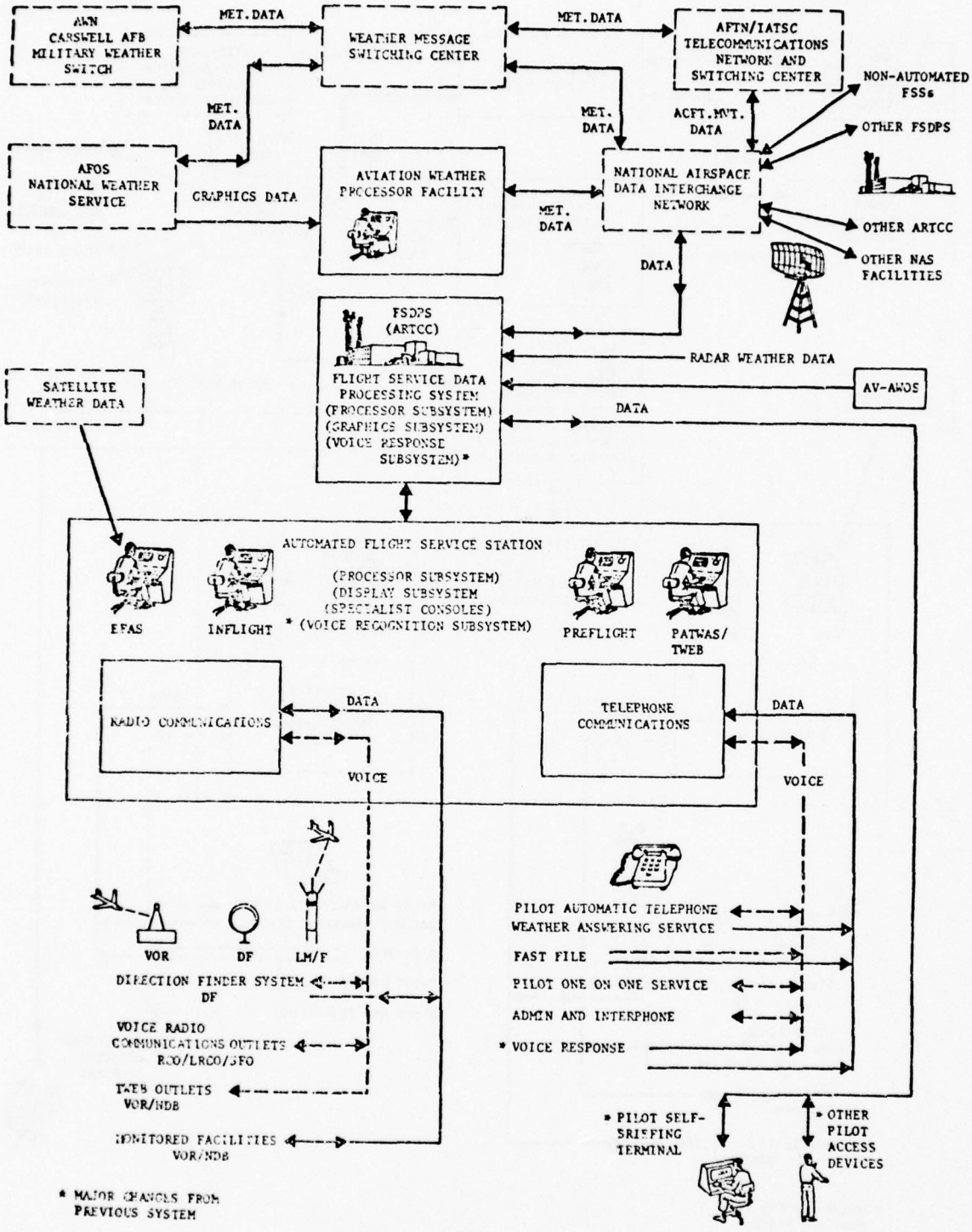


FIGURE 4-4
MODEL 3 SYSTEM BLOCK DIAGRAM
AUTOMATED FIGHT SERVICE STATIONS

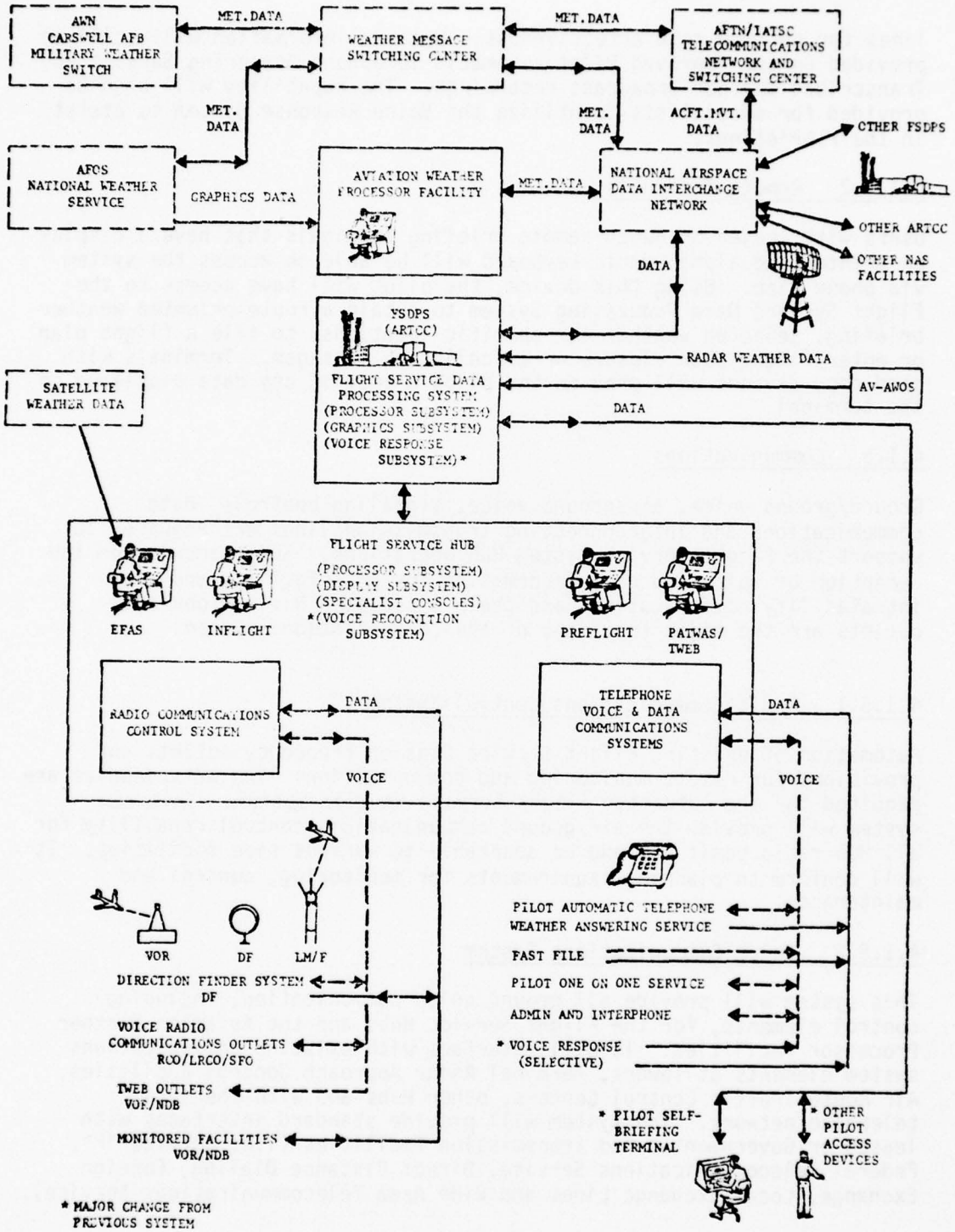


FIGURE 4-5
MODEL 3 SYSTEM BLOCK DIAGRAM
FLIGHT SERVICE HUBS

lines for optimum cost effectiveness. Weather information will still be provided on the improved Pilot Automatic Telephone Answering Service and Transcribed Weather Broadcast recordings. The capability will also be provided for specialists to utilize the Voice Response System to assist in their briefings.

4.1.4.2 Remote Terminals

Users with leased or owned remote briefing terminals that have a display or printer and alphanumeric keyboard will be able to access the system via phone line. Using this device, the pilot will have access to the Flight Service Data Processing System to obtain a route-oriented weather briefing, selected weather for specific locations; to file a flight plan or enter flight plan closure or cancellation messages. Terminals with hard copy devices will provide the pilot a copy of any data displayed on the terminal.

4.1.5 Communications

Ground/ground voice, air/ground voice, signaling controls, data communications and interconnecting transmission lines are required to support the Flight Service System Hub operations. The transmission and reception of voice and data information for interfacility and intrafacility communications and their associated Navigational Aid outlets are the major functions of the communications system.

4.1.5.1 Radio Communications Control System

Automation of existing Flight Service Station frequency outlets and provisions for remote monitoring and communications line efficiencies are required for the Automated Flight Service Station System. This new system will provide the air/ground communications control capability for all Hub radio positions and be adaptable to various size facilities. It will conform to planning requirements for monitoring, control and maintenance.

4.1.5.2 Voice Communications System

This system will provide all ground voice communication, including control elements, for the Flight Service Hubs and the Aviation Weather Processor facilities. It will interface with existing communications system elements at Towers, Terminal Radar Approach Control Facilities, Air Route Traffic Control Centers, other Hubs and with the local telephone network. The system will provide standard interfaces with leased or Government-owned transmission facilities (i.e. Service "F", Federal Telecommunications Service, Direct Distance Dialing, Foreign Exchange, Local Exchange Lines and Wide Area Telecommunications Service).

4.1.5.3 Data Communications System

This system will provide for all data communications for operational and maintenance functions with the exception of those supplied internally to Flight Service Data Processing System. The data communications system will be able to accommodate configuration and sizing changes with minimal hardware or software changes. (See Section 6 for further information.)

4.1.6 System Support and Training Facilities

4.1.6.1 System Support Facility

A System Support Facility located at the National Aviation Facilities Experimental Center will provide for maintenance of the operational and operational support programs for each system model. Included will be the maintenance of the national system adaptation data base. Consoles, Automated Flight Service Stations, Flight Service Data Processing System, and Aviation Weather Processor Systems will be provided as required for each system model. This facility will also support future hardware modifications.

4.1.6.2 System Training Facility

A system Training Facility located at the FAA Academy will provide maintenance and operating personnel training for operation, management, testing and maintenance of the operational and support software for each system model. This training facility will also provide training for maintenance personnel who will maintain the computer system and specialist display consoles. Consoles, Automated Flight Service Station, Aviation Weather Processor, and Flight Service Data Processing System automation systems will be provided as required for each system model.

4.1.7 System Interfaces

This section describes the automated interfaces between the data processing subsystems and the remote facilities for each of the 3 models.

4.1.7.1 Model 1 Interfaces

The Model 1 Flight Service Data Processing Systems will interface with the following remote facilities:

(1) Weather Message Switching Center by dedicated lines for the receipt and transmission of weather and Notice to Airmen data.

(2) Remote terminals at Automated Flight Service Stations by dedicated and/or dial-in lines for specialist's weather briefings and flight plan filings.

(3) Air Route Traffic Control Centers, other Flight Service Data Processing Systems, and other Flight Service Stations by the automated Service B Data Interchange System for the receipt and transmission of flight plan data and administrative messages.

4.1.7.2 Model 2 Interfaces

The Model 2 has 2 distinct data processing subsystems: The Aviation Weather Processors and the Flight Service Data Processing Systems. The Aviation Weather Processors will interface with the following remote facilities:

(1) Weather Message Switching Center by National Airspace Data Interchange Network for the receipt and transmission of weather and Notice to Airmen data.

(2) National Weather Service's National Meteorological Center by a dedicated line for the receipt of graphic weather chart data.

(3) Air Traffic Control System Command Center by National Airspace Data Interchange Network for the receipt of flow control messages.

(4) Flight Service Data Processing Systems by National Airspace Data Interchange Network for receipt and transmission of weather and Notice to Airmen data. The Aviation Weather Processor will also transmit graphic weather chart data over this interface.

The Flight Service Data Processing Systems will interface with the following remote facilities:

(1) The Aviation Weather Processor by National Airspace Data Interchange Network for the receipt and transmission of weather and Notice to Airmen data.

(2) Air Route Traffic Control Centers, other Flight Service Data Processing Systems, Nonautomated Flight Service Stations, and selected military installations by National Airspace Data Interchange Network for the receipt and transmission of flight movement and administrative messages.

(3) Air Traffic Control System Command Center's Airport Reservation Office by National Airspace Data Interchange Network for the receipt and transmission of messages concerning reservations at appropriate airports.

(4) Pilot Self Briefing Terminals by dedicated and dial-up lines for user weather briefings and flight plan filings.

(5) Weather radar by dedicated and dial-up lines for the receipt of digitized weather radar data from remote radar sites.

(6) The remote terminals at Automated Flight Service Stations by dedicated and dial-up lines.

(7) The specialist terminals at the Flight Service Hub by dedicated lines.

4.1.7.3 Model 3 Interfaces

In support of Model 3 enhancements the Flight Service Data Processing System will also interface with the following system or facilities:

(1) The Voice Response System processor via dedicated lines.

(2) The Aviation Automated Weather Observation System via dedicated lines for collection of weather observation data.

5.0 PROGRAM IMPLEMENTATION

This section, in overview form, describes system acquisitions, site preparation, systems installation and testing, building construction, consolidation, and the program schedules required to implement the program. Detailed plans and schedules are to be developed to direct each area.

5.1 System Acquisition

There are 3 major system acquisitions included in this program: automation, Radio Communications Control System and building space. The first 2 acquisitions involve hardware and software. Contracts for each are to be competitively awarded and to be funded over several years. Each contract will include contractor installations of all systems, provisions for site and depot logistics, and documentation for maintenance, operations, training, logistics and systems support.

A benchmark will assure adequate hardware configuration and efficient software. The automation acquisition is to include a benchmark/design verification period before award of the production contract. At this time, up to 3 contractors will each physically establish a Model 2 System of hardware, similar to that proposed for delivery during the production phase for verification of system design, throughput and capacity. Verification will include, but not be limited to, the operating system, applications and support software. The initial automation system production contract is to cover delivery of all Model 1 and Model 2 Systems following design verification. Model 3 production acquisition and deployment will be the subject of a separate procurement.

5.2 Models 1 and 2 Site Preparation

Site preparation will be required in each of 20 Air Route Traffic Control Centers, the Automated Flight Service Stations, National Aviation Facilities Experimental Center and the Academy. Existing space in each Air Route Traffic Control Center will be adapted to provide a suitable environment for the Models 1 and 2 automation equipment (Flight Service Data Processing System). Requirements will be refined following award of the production contract. No site preparation is anticipated at the Weather Message Switching Center for the Model 1 System interfaces. At the Automated Flight Service Stations, preparation will be needed to install new consoles and remoted displays at specialist positions and to provide space for interface equipment. Site preparation standards for display consoles will be provided. Modification of some Flight Service Station operations areas will be required. Regions will be responsible for site adapting Models 1 and 2 standard plans to each Air Route Traffic Control Center building and to accomplish the necessary alterations and site preparation to accept the equipment deliveries shown in Figures 5-1, 5-2 and 5-3. The National Aviation Facilities Experimental Center and the Academy will provide space for their systems.

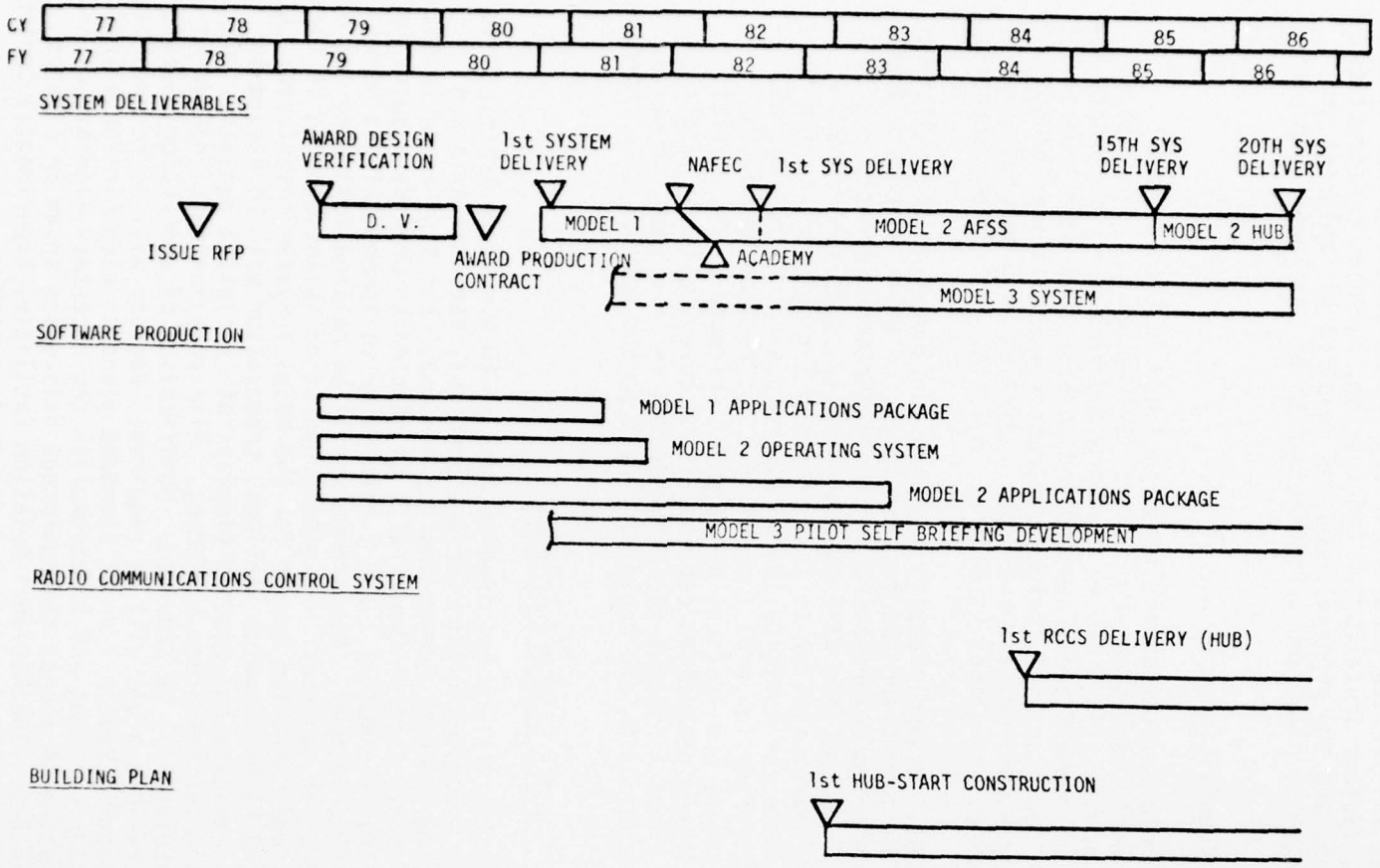


FIGURE 5-1
FLIGHT SERVICE STATION AUTOMATION PROGRAM SCHEDULE

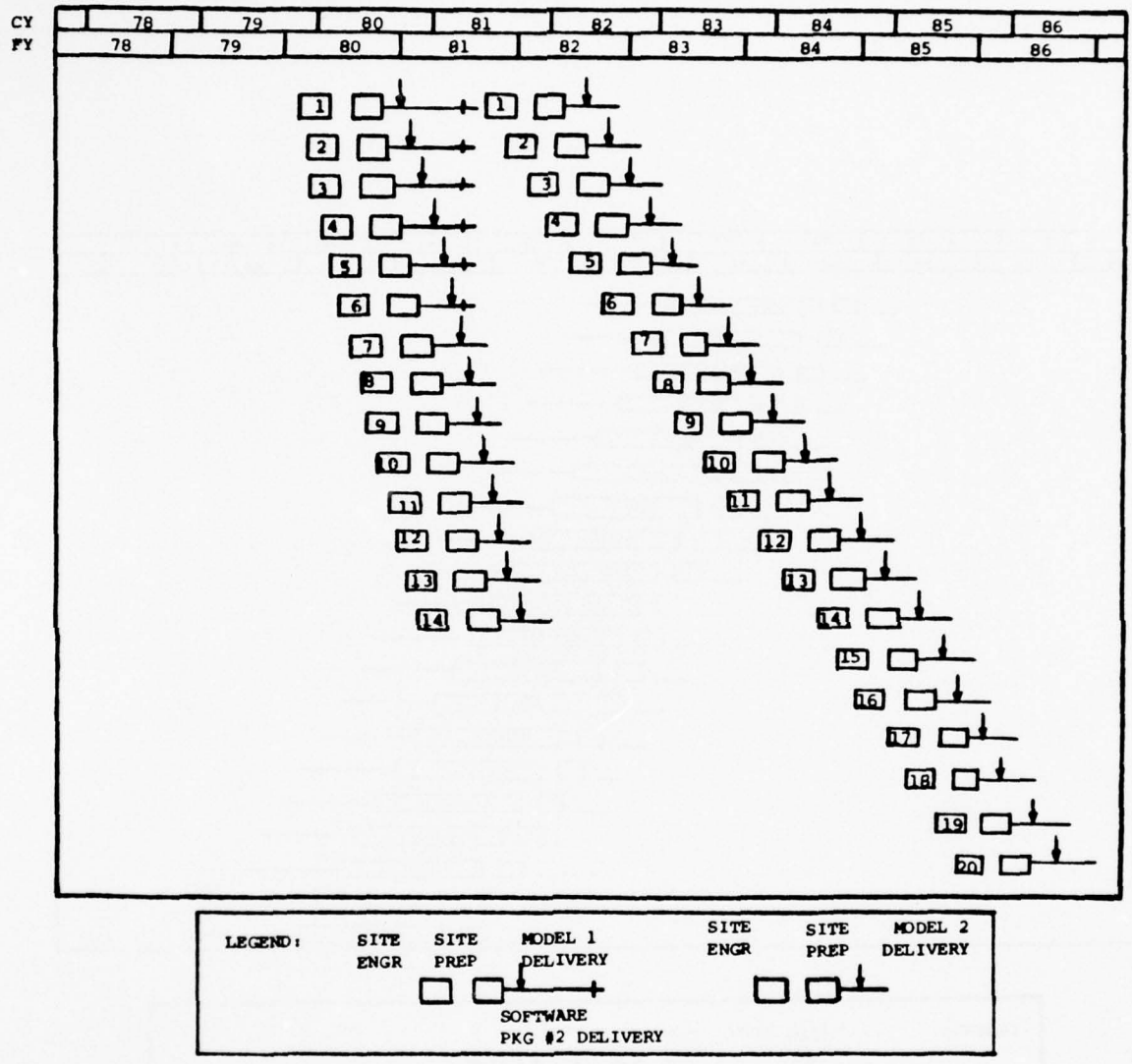


FIGURE 5-2

SCHEDULE - MODEL 1 AND MODEL 2 SYSTEMS

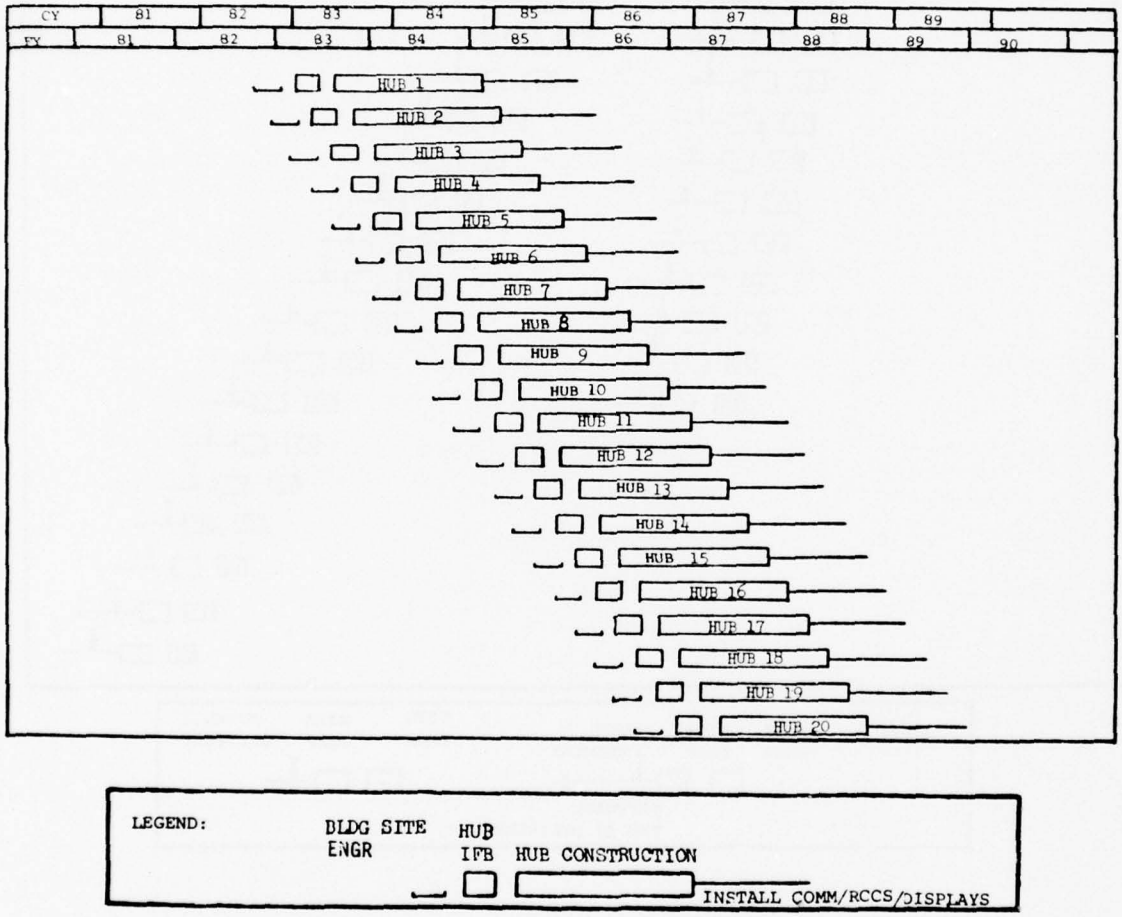


FIGURE 5-3

SCHEDULE - MODEL 2 HUBS

5.3 Consolidation Building Program

A contract will be issued to an architect and engineering firm to develop a Flight Service Hub standard design for expansion of the Air Route Traffic Control Center building. This design will be prepared during Phase B of the program in order to have an approved design available to start actual construction early in Phase C. An architect and engineering firm will also site adapt the standard Flight Service Hub building to each Air Route Traffic Control Center plot. Special site adaptations will be required for nonstandard buildings.

The Flight Service Hub buildings will require sufficient space to house personnel from the consolidated Flight Service Stations, the associated communications systems, the operations rooms, and the technical and administrative areas to support the facility. Two sizes of standard buildings are being planned. The smaller facility will accommodate up to 60 operating positions (consoles) and the larger facility will accommodate the maximum projected size Flight Service Hub with 85 operations positions. The smaller facility will be expandable to the maximum facility size if requirements beyond 1995 require additional space.

The Aviation Weather Processor building requirements have been incorporated into the National Airspace Data Interchange Network Program. Additional collocation space will be provided in the National Airspace Data Interchange Network design.

All the requirements of OMB Circular No. A95 Revised, "Evaluation, Review and Coordination of Federal and Federally Assisted Programs and Projects," will be met. An environmental impact statement will be prepared for consolidation Phases C and D in accordance with appropriate regulations. Architectural and engineering designs are to be developed so as to be compatible with Order 4660.1, Administrative Space Management. If standard space allowances are not applicable, functions may be developed with the concurrence of the appropriate office having the responsibility for national space standards.

5.4 Acquisition Implementation Schedule

Figure 5-1 depicts the three major acquisitions in this program (automation, Radio Communications Control System and Hub buildings). The basic schedule has been developed from the automation acquisition plan, i.e., Model 1 field delivery to start late 1980 and Model 2 field delivery to start in mid-1982. A typical site implementation schedule for Models 1 and 2 System with delivery rates of 1 per month and 4 per year, respectively, generates the waterfall schedule shown in Figure 5-2. At this point in time, this national schedule, without facility names, is used only for predicting system operating costs and a general

analysis of Model 1 Program life and implementation strategies. A schedule for Model 2 Hubs is shown in Figure 5-3.

5.5 System Installation and Testing

System installation will be accomplished in accordance with an implementation plan for the automated systems. Overall, system installations will comply with the acquisition implementation schedules of paragraph 5.4 above.

The contractor(s) will install, debug, and test the automation equipment and software at all designated facilities for Model 1, 2, and 3 Systems. Contractor test procedures will include information to assure equipment and system compliance with all functional environmental, electrical, mechanical, reliability, maintainability and response time requirements. System site tests will verify system and system interface operation in compliance with all design requirements.

5.6 Government Furnished Information, Equipment and Services

FAA will furnish contractor(s) with information on the facilities to be provided. Communications, buildings, and site adaptation data and consoles will be furnished.

5.7 Operational Transition During Consolidation

This section describes consolidation in terms of the service affected; specifically, preflight service, inflight service, and weather observations. A specific constraint on consolidation is that service to the users cannot be interrupted.

5.7.1 Preflight Service

This service will be transferred to the Flight Service Hub when communications lines are available for local telephone service, selective foreign exchange service, intra/interstate Wide Area Telecommunications Service and Pilot Automatic Telephone Weather Answering Service/Transcribed Weather Broadcast Service. The actual communications line quantities required to support each of these services will be adapted to the preflight demand of each particular Flight Service Station. As the new lines are activated, all local exchange and foreign exchange callers to the old station will be provided the new Hub telephone number on a recording. Initially, the preflight demand served by the Flight Service Hub will be that of at least one Flight Service Station; the preflight demand of other stations within the Hub area will be gradually assumed. This gradual consolidation of preflight demand is to minimize potential operational problems of the transition.

5.7.2 Inflight (Air/Ground) Service

Inflight services considered include weather briefings, progress reports, flight plan filings, emergency assists, En Route Flight Advisory Service, and the relaying of Air Traffic Control messages. Consolidation of inflight positions from a closing station to the new Flight Service Hub commences with the transfer of Navigational Aid status monitoring and control functions. The inflight specialists and support personnel report to the appropriate Flight Service Hub facility at the same time that the transmitter and receiver control equipment at the Flight Service Hub is activated. No frequency changes or deletions are planned at this time. Private lines are leased for communications to the Navigational Aid sites. After a Flight Service Station is deactivated, the old site, if required, will become a Remote Communications Outlet. During the transition, it may also be desirable to relocate transmitters and receivers to provide better system coverage and/or provide coverage in a more cost-effective manner. Any modification made will require compatibility analyses.

5.7.3 Weather Observations

The primary purpose of surface weather observations is to provide information about the state of specific weather parameters at a specific time and place, and to facilitate forecasts of those weather parameters. Currently, aviation surface weather observations are taken at approximately 200 Flight Service Station locations; some of these also provide synoptic observations for the National Weather Service for use in preparing analyses, forecasts, warnings, and provide data for international exchange. Implementation of the new system and consolidation of existing stations will require weather observations by some other means. The OST/FAA study considered five alternative approaches for acquiring weather observations. These are listed below:

Alternatives

1. Contract the service to the airport managers, Fixed Base Operators, airport guards and/or others stationed at the airport.

2. Automate observations (Aviation Automated Weather Observation System, Automatic Meteorological Observation Station).

3. Transfer to National Weather Service.

4. Install runway visual range with data link to the cockpit.

5. Transfer to control towers.

In coordination with the National Weather Service, weather observations will be addressed on a case-by-case basis considering the requirement for the observations at each particular site and the most appropriate means of providing whatever observations are required.

6.0 MAJOR PROGRAM RELATIONSHIPS

6.1 General

This section describes the relationships between the Flight Service Station Automation Program and other major programs both within the FAA and other agencies.

The Flight Service Information System will interface directly or indirectly with the nearly every major system or subsystem comprising the National Airspace System; sharing and interchanging weather, aeronautical, flight plan, and air traffic control information and messages. Future planned programs related to the Automation Program include: Use of a Discrete Address Beacon System data link for relay of en route and terminal weather and pilot reports; communication with the Central Flow Control Facility for interchange of weather, aeronautical, and flight plan information; and a system for automatic monitoring of navigational aids. Some interaction on future emergency service provisions is also anticipated relevant to combining the utilization of direction finding equipment and Air Traffic Control radars. Coordinated efforts will be necessary to define the basic interface requirements, data flow, and format. Closely related system developments of particular interest to the Automation Program are described in the following paragraphs.

The Flight Service Information System of the future requires air/ground voice, ground/ground voice and ground/ground digital communications. Table 6-1 describes the various requirements for each program phase and contains a listing of how each of these communications capabilities will be provided from the program viewpoint.

6.2 Related FAA Programs and Activities

6.2.1 National Airspace Data Interchange Network

The National Airspace Data Interchange Network Program is independent of the Flight Service Station Automation Program and will provide the communication network (switches, concentrators and lines) through which the elements of the Flight Service Information System will communicate in the ground/ground digital mode for both intrasystem and intersystem interfaces. A more detailed description of this program and its interfaces is contained in Section 4.0 of this plan and the document "System Description for the Flight Service Station Automation Program."

6.2.2 Mass Weather Dissemination Improvements

Present operations provide mass dissemination of aviation weather information by 2 primary techniques, Pilot Automatic Telephone Weather Answering Service and Transcribed Weather Broadcast.

TABLE 6-1

PROVISIONS FOR COMMUNICATIONS CAPABILITIES

COMMUNICATIONS REQUIREMENTS	PROGRAM PHASE	CAPABILITIES PROVIDED BY
AIR/GROUND VOICE	A/B	PRESENT SYSTEM
	C/D	FSS PROGRAM (RCCS)[1]
GROUND/GROUND VOICE	A/B	PRESENT SYSTEM
	C/D	FSS PROGRAM (VCS)[2]
GROUND/GROUND DIGITAL	A	PRESENT SYSTEM
	B/C/D	NADIN[3]

(1) RCCS = Radio Communications Control System

(2) VCS = Voice Communications System

(3) NADIN = National Airspace Data Interchange Network

Improvements to the existing Pilot Automatic Telephone Weather Answering Service and Transcribed Weather Broadcast services will be concerned with increases in system accessibility, usability, and efficiency. Accessibility will be enhanced by the addition of more outlets and increased number of access lines per outlet. Usability improvements will be accomplished by individually accessible, route-oriented recordings, product improvements, more frequent updates and national standard formats for Pilot Automatic Telephone Weather Answering Service and Transcribed Weather Broadcast. Improvements in system efficiency will be accomplished by automatic recording text preparation, segmentation of recordings to decrease required update time, and the judicious integration and consolidation of the update function. Equipment modernization and procedural changes are also an important aspect of the Mass Weather Dissemination Program.

With little more capacity (hardware and software) than required to accomplish the above, a direct access to the system by the users will be provided to achieve a Fast-File capability -- direct recording of user entered flight plans for eventual playback and entry by the specialist into the Flight Service Information System.

Although the improvements in mass dissemination and Fast-File capability directly affect the Automated Flight Service System, this effort is not considered part of the Automation Program. The mass dissemination end items will be an operational subsystem which will be in place during the Model 1 and 2 time frame. This capability will be integrated with the Voice Response System when it is deployed. Mass dissemination is a separately funded, independent but related program effort.

6.2.3 Aviation Automated Weather Observation System

The Federal Aviation Administration as well as the National Weather Service utilizes weather observations to provide local weather information. Currently, aviation surface weather observations are used for flight planning, forecasting, adverse weather warnings, and, in addition, to provide forecast terminal conditions to airborne pilots as required during critical portions of flight. Many of these observations are currently taken by Flight Service Station Specialists at locations that will be consolidated during the Automation Program.

The FAA, in conjunction with the National Weather Service, is developing the Aviation Automated Weather Observation System. The Flight Service Station Automation Program assumes the development of the Aviation Automated Weather Observation System will provide the automated, cost-effective solution for required weather observations at some of the Flight Service Stations planned for consolidation. Implementation of the Automated Flight Service Station System is not dependent on the Aviation

Automated Weather Observation System in that contracted weather observations can be arranged where required. However, implementation of the Aviation Automated Weather Observation System equipment is highly desirable. Coordination to effectively interface the Aviation Automated Weather Observation System equipment with the automated system will continue on an expanded basis as the program progresses and specific criteria such as locations required for dissemination of Aviation Automated Weather Observation System data, etc., are developed.

6.2.4 Weather Radar Interfaces

FAA responsibility for weather radar data to support En Route Flight Advisory Service is planned for accomplishment in the 1979/1980 time frame. This service is to be provided to the Automated Flight Service Station System in the same manner as today's system. Digitized weather radar data will be received via dial-up/dedicated communications lines from FAA long-range radars and National Weather Service radars.

6.3 Interagency System Interfaces

The Flight Service Information System must interface with other government systems that provide air traffic control and aviation meteorological services. Within the civil portion of the Federal establishment, air traffic control services are provided by the FAA, and aviation meteorological services are jointly provided by FAA and National Weather Service. The Department of Defense, the Army, Air Force and Navy all have responsibilities in air traffic control. The Air Force provides meteorological services for both the Air Force and Army while the Navy operates their own weather service.

6.3.1 Military Flight Service Functions

FAA responsibility for air traffic control was established by the Federal Aviation Act of 1958. Although the military departments retain some air traffic control responsibility, by mutual agreement, the FAA has assumed the responsibility for provision of much of the additional flight service for military aviation formerly provided by the military. The current Memorandum of Agreement between the Department of Defense and the FAA regarding flight service function was signed by FAA on October 21, 1964.

Selected Department of Defense installations will be connected to the National Airspace Data Interchange Network. They will be capable of receiving and transmitting aeronautical and flight movement data to and from other Department of Defense installations, Air Route Traffic Control Centers, Flight Service Stations, and Flight Service Hubs. Flight movement data messages for military arrival or departures from civil airports will be addressed to appropriate military or civil addresses.

6.3.2 Military Aviation Weather Interfaces

The Flight Service Information System will not have a direct interface with any military weather system. All military weather information required in the Flight Service Information System will be received from the FAA's Weather Message Switching Center.

6.3.3 Civil Aviation Weather Interfaces

FAA and National Weather Service have many mutual responsibilities in aviation weather services and meteorological communications. Both are responsible for making surface aviation weather observations which are required as a basis for the domestic weather system. Where both National Weather Service and FAA have Weather Service Offices and Flight Service Stations at an airport, National Weather Service makes the observations; otherwise, the one located at that airport will make the observations.

Both organizations have pilot briefing responsibilities; but where both are located at an airport, the Flight Service Station will provide weather briefings since the FAA has the primary responsibility for this function.

FAA operates the weather teletypewriter systems and the Weather Message Switching Center currently used by both FAA and National Weather Service for collection and transmission of alphanumeric weather data.

The National Weather Service operates a system of specialized meteorological centers, Weather Service Forecast Offices and Weather Service Offices which produce the analyses and forecasts for the domestic weather system and the specialized weather services, of which the Aviation Weather Service is one. National Weather Service also operates several facsimile services for the transmission of graphic analyses and forecasts and a network of weather radars. Observed data is made available in both alphanumeric and graphic form and is currently utilized by the Flight Service Stations.

6.3.3.1 Automation of Field Operations and Services

The National Weather Service is well underway with a program called Automation of Field Operations and Services. When this program is completed within the next five years, all National Weather Service units will have varying degrees of automation, and all will be served by a digital National Distribution Circuit. Products or data originating at any National Weather Service facility, or transmitted to any National Weather Service facility from an external source, will then be transmitted to all other National Weather Service facilities without going through the Weather Message Switching Center. Automation of Field Operations and Services will free National Weather Service from the time

delays and volume constraints imposed by the slow weather teletypewriter circuits. Automation of Field Operations and Services will continue to have an interface with the Weather Message Switching Center for delivery of the National Weather Service originated data and acceptance of data originated by sources external to Automation of Field Operations and Services.

The new Automation of Field Operations and Services system will be one of the major interfaces required by the Flight Service Information System. As Automation of Field Operations and Services becomes operational, reconfiguration of Weather Message Switching Center circuits will be required, and when the Flight Service Information System begins to be implemented, additional changes will take place in Weather Message Switching Center circuits and operations.

7.0 PROGRAM MANAGEMENT

7.1 General

This section is an overview of the method that the agency will use to manage and direct the Flight Service Station Automation Program.

7.2 Program Direction

Direction to the program is provided in the form of written policy and also from FAA management at the Associate Administrator level.

7.2.1 Written Policy

The Flight Service Station Automation Program is being implemented in conformance with Order 1000.1, Policy Statement of the Federal Aviation Agency, which is concerned with ensuring safety, promoting air commerce, supporting national security, and achieving effective airspace utilization. All actions to achieve the objectives of the program are to be based on the precepts outlined in Order 1000.1 and the following policy documentation.

Order 1000.27, NAS Policy Summary and Ten Year Plan

Order 1100.1, FAA Organization - Policies and Standards

Order 1100.2, FAA Organization - FAA Headquarters

Order 1100.5, FAA Organization - Field

Order 1800.8D, NASA Configuration Management

Order 1800.13A, FAA Planning and Resource Allocation

Order 1810.1, System Acquisition Management

7.2.2 Agency Direction

Agency level direction of the Program is provided by the Administrator in accordance with FAA System Acquisition Management Order 1810.1. The following organizations are represented on the Systems Requirements Group at Director, Deputy Director or equivalent level.

a. Associate Administrator for Policy Development and Review

b. Associate Administrator for Administration

c. Associate Administrator for Air Traffic and Airway Facilities

d. Associate Administrator for Engineering and Development

e. Director, Flight Standards Service

The System Requirements Group provides leadership, advice and counsel for managing the continuing process of defining, validating, documenting and revising system requirements for major systems.

In support of the Flight Service Station Automation Program, the System Requirements Group will:

1. Process and validate the System Requirement Statement (a document).

2. Review and maintain the integrity of the System Requirements Statement.

3. Initiate and maintain the Requirements Tracking System.

4. Present significant and/or unresolvable issues to the Administrator.

5. Monitor program status.

Prior to the issuance of this document, agency level direction of the Flight Service Station Automation Program was provided by a Steering Committee composed of Associate Administrators and Service Directors. The Program Manager will now receive this agency level direction from the Administrator.

7.3. Program Management Structure

The Program Manager is responsible for developing, coordinating, and monitoring the total Flight Service Station Automation Program from the engineering and development cycle through the operation cycle. He will provide the focal point through which organizations participating in the program may function on an integrated basis. The Program Manager will keep the System Requirements Group informed on program status through the issuance of routine status reports in accordance with Order 1810.1.

The Associate Administrator for Engineering and Development will designate a Program Manager for the engineering and development cycle and implementation of each model at the first field (operational) facility. The Director, Airway Facilities Service will designate the Program Manager responsible for implementation of the Flight Service Information System at the subsequent field facilities. The current program management is by direction and varies with Order 1810.1.

Supporting the Program Manager are Associate Managers from the principal participating organizations. Each Associate Manager is responsible for coordinating those efforts associated with that organization's stated mission. The organizations providing the Associate Managers are:

1. Systems Research and Development Service
2. Airway Facilities Service
3. Air Traffic Service
4. Logistics Service
5. Office of Personnel and Training
6. Associate Administrator for Air Traffic and Airway Facilities
7. Office of Budget

7.4 Participating Organizations

Organizations participating will be called on to carry out their assigned roles and responsibilities as enumerated in the following FAA Handbooks.

1100.1, FAA Organization - Policies and Standards

1100.2, FAA Organization - FAA Headquarters

1100.5, FAA Organization - Field

These handbooks are the principal medium by which the Administration establishes major organizational concepts and structure, assigns missions and functions, and delegates authority. The mission and functions of each of the Headquarters Offices and Services are delineated in Handbook 1100.2 and the mission and functions of the Regions and Centers are delineated in Handbook 1100.5.

7.5 Configuration Management

The configuration management procedures as delineated in Agency Order 1800.8D will be used to establish and maintain an approved system configuration to achieve an optimum degree of uniformity in the end items of this program.

8.0 LOGISTICS SUPPORT

8.1 General

It is the agency's intent to use off-the-shelf hardware in both of the major systems acquisitions included in the Flight Service Information System. Maintenance concepts and reliability/maintainability requirements will be similar for the two major acquisitions.

Planning, definition, budgeting, and timely acquisition of supply support for all sites and the Depot will be accomplished in accordance with existing policy and guidance; consisting of but not limited to documentation, spares, parts common and peculiar, tools and test equipment, etc.

8.2 Budgeting

Budgeting estimates for logistics have been developed and are included in the Financial Section (see Section 12). The budget planning guidance of Airway Facilities Service, Logistics Service, and the Depot has been employed.

8.3 Depot and Site Support Requirements

Program offices will arrange, through use of planning documents and in coordination with the Aeronautical Center and the Logistics Service, for the availability of the required logistic support concurrent with delivery of any articles of equipment.

The equipment contracts will include the following basic provisioning specifications:

FAA-G-2110, Provisioning Technical Documentation

FAA-G-1375, Spare Parts-Peculiar for Electronic, Electrical and Mechanical Equipment

The requirements of the above specifications shall be detailed in the contracts as individually deliverable items.

Additional spare parts-peculiar and parts-common required to initially fill the pipeline of supply shall be selected by the FAA Depot with the assistance of program offices.

The items and quantities of items of parts-peculiar and parts-common selected for initial stock requirements on site (Initial Supply Support Allowance Chart items) and in FAA Depot inventory shall be tailored to the applicable plan for maintaining the equipment in operation.

Computation of requirements and stock requirements shall be in accordance with current supply resources.

8.4 Test Equipment

Within the Air Route Traffic Control Center where each Flight Service Data Processing System is to be collocated, there are a number of existing systems for which test equipments have been purchased. In accordance with Airway Facilities Service policy, the requirements for new test equipments will incorporate possible usage of existing test equipment to the maximum extent possible.

8.5 Logistics Support Planning

A maintenance concepts and requirements document will be developed by the Airway Facilities Service for each of the major system acquisitions. A logistics support plan based on the above will be developed for each of the major system acquisitions under the direction of the Program Officer.

These support plans will include a specific set of milestones to be included in the overall program schedule for both the system production and follow-on logistics procurements. Critical points of review monitoring and approval will be identified and included.

8.6 Utility Service Planning; Restrictions on New or Additional Service Requirements

In the advance planning, recognition should be given to the need for coordination between the Airway Facilities Division and Logistic Division at the Regional Office level for Utility Service Planning because of the Energy Conservation Moratoriums which have been levied in some geographical locations. The utility contracting officer and the Airway Facilities Service Program Officer shall collaborate to provide input on the availability of the proposed use of utility services prior to the designed phase.

8.7 Development of Space Planning Requirements and Standards

Architectural and Engineering designs are to be developed so as to be compatible with Order 4660.1, Administrative Space Management. If standard space allowances are not applicable, functions may be developed with the concurrence of the office having the responsibility for national space standards.

8.8 Development of Planning for Lease and Utility Termination or Reassignment of Space

The advance planning should take into consideration any proposed changes in use or non-use of existing facilities or which will have an effect or to cause to bring about an amendment or change to the instrument presently in force. Consideration should be given to funding for restoration cost when required or increases in cost for additional services.

9.0 STAFFING

9.1 General

The planned levels of Air Traffic and Airway Facilities personnel staffing and the rationale for planned personnel phasing through 1995 are covered in this section.

9.2 Air Traffic Staffing

Based on the agency's engineered staffing standard, an estimated 2,000 Air Traffic Specialist positions above those authorized would be required in FY-1978 to staff the present system (approximately 1500 for the conterminous U.S. Flight Service Stations that are considered for automation). Using this standard as a basis, the number of positions needed would increase by approximately 350 per year for the next several years. Such a labor-intensive system is not considered to be economically feasible or administratively practical.

The authorized staff of 5,000 planned through FY-1980 is based upon the assessment that the interim system will be staffed so a reduction-in-force will not be necessary when the automated system is fully implemented. A small increase in staffing is required for implementation of Model 1 and Model 2. As Model 3 enhancements and consolidation are accomplished, a decline in staffing is projected (see Table 9-1).

Staffing for the initial Flight Service Hubs, excluding the transitional and automation personnel increments, is expected to be obtained as a result of staff savings achieved by the introduction of Pilot Automatic Telephone Weather Answering Service and Transcribed Weather Broadcast program on a national level and from part-timing of low activity facilities. Consolidations are not planned during the Model 1 and Model 2 System installation. Flight Service Station staffing in the conterminous U.S. is expected to remain at approximately 4,500 through FY-1979. At that time a staff increase to accommodate training of personnel for transition and automation functions will be needed. This increase will continue on a yearly basis until it peaks at 4,740 by 1985 and continue through 1987. Model 3 System improvements and consolidation will enable reduction in staffing levels (see Table 9-1) provided pilot self-service expectations are achieved.

Plans call for the phasing out of 15-50 domestic Flight Service Stations per year between FY 1984 and 1993, at which time there will be 20 operational Flight Service Hubs (and Aviation Weather Processors) and 27 nondomestic Flight Service Stations/International Flight Service Stations (see Table 9-1).

TABLE 9-1

PLANNED AIR TRAFFIC STAFFING FOR FLIGHT SERVICE INFORMATION SYSTEM

FY	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
STAFFING																			
U.S. & Possession	5000	5000	5000	5200	5200	5200	5200	5220	5240	5240	5240	5155	4770	4415	4100	3700	3380	3100	2875
Conterminous U.S.	4500	4500	4500	4700	4700	4700	4700	4720	4740	4740	4740	4655	4270	3915	3600	3200	2880	2600	2375
FACILITIES																			
Flight Service Hubs Per Year									2	4	5	5	4						
Total									2	6	11	16	20	20	20	20	20	20	20
FSS																			
Nondomestic	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Domestic	292	292	292	292	292	292	292	292	292	277	242	192	142	97	52	17	0	0	0
Closed	-	-	-	-	-	-	-	-	(-15)	(-35)	(-50)	(-50)	(-45)	(-45)	(-35)	(-17)	0	0	0
Total Closed	-	-	-	-	-	-	-	-	-	15	50	100	150	195	240	275	292	0	0

9.3 Airway Facilities Staffing

9.3.1 Maintenance Staff

The maintenance manpower system will change from the present widely dispersed system into a more centrally oriented system. Appropriate adjustments will have to made in the manpower complement at facilities impacted by automation.

Airway Facilities manpower will remain relatively constant at most non-automated Flight Service Stations. The Model 1 Automation System will require an additional 19 maintenance people. These positions will be phased into the Model 2 System as they become fully operational. The Level III Automated Flight Service Stations will require 2 additional technicians to maintain the Model 2 display equipment. When a station is consolidated, the remaining equipment systems needed for Air/Ground Communications, Direction Finder, etc., will continue to be maintained at the site.

Table 9-2 shows an estimated staff of 10 for the Aviation Weather Processors and 4.5 for each Model 2 Flight Service Data Processing System. These people are required sufficiently in advance of equipment installation to allow for FAA Academy and on-the-job training prior to commissioning each installation.

When consolidation occurs, each Hub will require 4 additional people for peripheral and display maintenance and 8 additional people to service and maintain the Radio Communications Control System equipment. As the Radio Communications Control System becomes operational, the improvements in equipment reliability and maintainability afforded by replacement of the old Air/Ground Radio Communications equipment will reduce the staff by 75. Maintenance staffing for the Flight Service Information System will peak in 1987 at 757 positions. By Fiscal Year 1988, the staffing demand will begin reducing as a result of deactivating the remote systems and improvements in equipment reliability and maintainability afforded by replacement of the Air/Ground Radio Communications equipment. The final Flight Service Information System staffing will be 700 positions (a net increase of 191 positions over the 1977 staff). (See Table 9.2).

9.3.2 Establishment Staff

During the automation phase, a large portion of the FAA Facilities and Equipment budget will be devoted to the program. A correspondingly large number of the regular Facilities and Equipment staff will be used to accomplish the regional engineering, design, construction and installation phases of the program.

The average Facilities and Equipment manpower requirement per Flight Service Data Processing System is estimated at 48 man-years over a

TABLE 9-2

PLANNED AIRWAY FACILITIES STAFF INCREMENTS
FOR FLIGHT SERVICE INFORMATION SYSTEM

FACILITY COUNT CUMULATIVE								ESTIMATED AIRWAY FACILITIES STAFFING CUMULATIVE - CHANGES IN TOTAL STAFFING ALLOWANCE (△TSA)								
		NEW	Equip. Delivery						NEW		MOD 1	MOD 2	RCS			TOTAL
FY	FSS	RCO	MOD 1	MOD 2	HUB	AWP	RCCS	FSS	RCO	RCCS	FSS	FSS	FSS	AFSS	AWP	△ TSA
78	292							509								509
79											10					519
80			7								19					528
81			14								16	9			10	544
82			12	2		2					8	27				554
83			6	6						12	1	49				581
84			1	11			2			37	0	53		26		635
85			0	12	2		6			69		62	- 20	77		707
86	277	15		14	6		11	483	26	100		40	- 60	141		740
87	242	50		9	11		16	422	87	125		18	-110	205		757
88	192	100		4	16		20	335	174			0	-160	256		740
89	142	150		0	20			247	262				-200			700
90	92	200						160	349							700
91	52	240						91	418							700
92	17	275						30	479							700
93	0	292						0	509							700

12-year period from initial Level 1 Flight Service Station part-timing until completion of all Flight Service Station consolidation and restoration. Peak manpower requirements of 7 to 10 people per year occur during Hub construction and initial consolidation phases. In regions where two or more Flight Service Hubs will be constructed, the combined Facilities and Equipment staffing requirements could require 20 or more personnel. Therefore, an effort will be made to stagger the schedule for regional Flight Service Hub construction. To minimize the work force fluctuation during this program, Facilities and Equipment personnel will be encouraged to voluntarily transfer between regions.

9.4 Staffing Summary

To meet increased demand prior to establishment of the Flight Service Hubs, low productivity Flight Service Stations will be part-timed and some positions moved to high activity facilities. The majority of personnel moves will coincide with consolidation of the Flight Service Information System into the Flight Service Hubs.

To insure uniform and equitable treatment of all employees, a national manpower adjustment plan will be implemented at least one year prior to establishment of the Flight Service Hub. The Model 3 System enhancements will result in a decreased staffing need which will be accomplished by normal attrition.

10.0 TRAINING

10.1 General

This section contains the training requirements needed by FAA personnel to provide proper operation and maintenance of the Flight Service Information System. The general practice of the FAA is to provide both operational (Air Traffic) and maintenance (Airway Facilities) training at the FAA Academy and, when practical, at the field facilities. The Flight Service Station Automation Program will necessitate modification to some of the existing courses to incorporate the automated equipment and functions, and new courses will be developed by the Academy and/or the contractor. The equipment contract will contain an option for training courses by the contractor. Academy instructors/developers, and personnel from the first site will be trained by the contractor. Subsequently, the Academy will assume training responsibility. Contractor training will also include training documentation and vendor support through information, consultation and other assistance in the preparation and teaching of FAA-taught courses while developing and updating course material. Training requirements are divided into the following categories:

- Operations
- Software
- Maintenance

Training during implementation of the three models is discussed in the following paragraphs.

10.2 Operational Training

10.2.1 Operational Equipment Training for Models 1, 2 and 3

Flight Service Station Specialists stationed at the Model 1 Automated Flight Service Station sites will be provided with operational equipment training. The course will consist of all input/output functions to be used operationally by the specialists. An initial course will be given by the contractor for Academy instructors/developers and instructors from the first operational sites. The Academy will then assume responsibility to train additional site instructors at the sites as they are integrated into the system. The facility instructors will assume the responsibility to train the remaining facility personnel.

When Model 2 is implemented, additional training will be required for each staffing category. Initial training will be supplied by the contractor until the Academy training program can be expanded to accommodate the larger numbers of staff to be trained in the field and at the Academy.

Model 3 training will be handled in a manner comparable to that for Model 2. However, this will probably require only a briefing package from the Academy.

10.2.2 Operational Equipment Training Utilizing Pilot Direct Access Devices

During the implementation of Model 2, a small number of direct access devices will be purchased for FAA evaluation; a limited number of units will be available to the aviation community primarily for evaluation.

Model 3 will provide the system capability to drive a larger number of user owned direct access devices. FAA Air Traffic operational personnel should be familiar with the procedures to be used at these peripheral terminals. A training option will be included in the equipment purchase contract.

10.3 Software Training

10.3.1 Programming for Flight Service Station Automation Specialists and System Performance Specialists

A course will be provided to those responsible for the limited programming activity for each Flight Service Data Processing System. Basic instruction is to be given in the high level and assembly languages used in the system, operation of the utility data reduction and analysis, plus hardware maintenance and test programs. Upon completion of this training, the specialist should have a knowledge of, and ability to use, the repertoire of instructions and software in the system plus the ability to utilize the operational program.

10.3.2 Programming and Assembly for System Support Facility Personnel

The System Support Facility at National Aviation Facilities Experimental Center will provide day-to-day support for all operational sites. Personnel must be adequately trained before delivery of the first system. Model 1 training will include software packaging, development, assembly, system testing, trouble-shooting and documentation. At least one contractor conducted course should be adequate for the number of personnel involved. Models 2 and 3 will require additional update training. System Support Facility personnel must also receive training similar to that given to field facility Automation Specialists. The contractor will provide the initial training for both categories of specialists. This responsibility will then be assumed by the Academy.

10.4 Maintenance Training

10.4.1 Model 1 Maintenance Training

Maintenance training for Model 1 will consist of hardware and software courses on the Flight Service Data Processing System at the Air Route Traffic Control Centers, on interface equipment between the Flight Service Data Processing System and the Automated Flight Service Stations, and on the input/output devices and displays located at the Automated Flight Service Stations.

It is intended that each contract for new equipment will contain a training option. This option will ensure that the maintenance staff at the first few sites will have received adequate training before the equipment is accepted by the Government. It also ensures that the Academy instructors will have received advance training necessary for preparation of the follow-on Academy courses.

Hardware training at the Air Route Traffic Control Center will cover the data processing units, disc control units, maintenance operator control consoles, real time clock and interface plug-in modules to the data transmission equipment.

Software training should consist of the diagnostic and support programs necessary to maintain the processor and associated equipments at the Air Route Traffic Control Center. The system operational and support programs will be contained in a separate course designed for both Airway Facilities and Air Traffic personnel.

Maintenance training at the Automated Flight Service Station will be on input/output devices including controllers, printers, journals and displays.

10.4.2 Model 2 Maintenance Training

In preparation for Model 2 implementation, maintenance personnel will be given a short update of the operational and support programs and training on the Pilot Self Briefing devices installed by the Government.

10.4.3. Model 3 Maintenance Training

Maintenance training on Model 3 will include Voice Response System units and other new equipment installed as enhancements to the system. Software training will be provided on the additional computer programs.

11.0 SECURITY

11.1 General

Successful completion of the Flight Service Station Automation Program requires that two distinct security concerns be addressed during the evolutionary implementation process. It will be necessary to provide physical security for Flight Service personnel and essential operational equipment during each stage of the automation process. In addition, full system implementation will result in significant reliance being placed upon the availability, reliability and integrity of the on-line, real-time Flight Service Station automated system. By designing system hardware and software so that security related threats are eliminated or minimized, an important precondition for successful system operation is assured.

11.2 References

- Order 1600.6A, Protection of Agency Property
- Order 1600.46, Physical Security Review of New Facilities Office Space or Operating Areas
- Order 1600.54, Security of FAA Automatic Data Processing Systems and Facilities
- Order 1600.24B, Use of Recording and Monitoring and Practices.

11.3 Facility Security

Various phases of the Flight Service Station Automation Program include the physical modification of existing Flight Service Station facilities and the construction of new Flight Service Hubs. As the number of Flight Service Stations decreases, the relative importance, size and capital investment of the remaining stations increase. A physical security program which recognizes changing environment must be part of the evolutionary process to full system implementation.

The construction of 20 Flight Service Hub facilities also requires the consideration of different physical security concerns as these facilities will become critical components of the National Airspace System. A Flight Service Hub security system which recognizes this role, but yet does not interfere unnecessarily with operations must be established. The projected collocation of Flight Service Data Processing System and Flight Service Hub facilities at existing Air Route Traffic Control Centers will require the existing Air Route Traffic Control Center security system be reevaluated to reflect the increasing national importance of the entire complex.

11.4 Computer System Security

The Flight Service Station Automation Program relies in large part on the successful introduction of computer equipment. Achievement of full automation will permit aviation community users to interact directly with the on-line computer system and perform data input/output transactions which presently require the involvement of a specialist. The benefits of increased staff productivity and improved user services depend, on large part, upon the availability and reliability of the computer system. One of the most attractive aspects of the system is the projected use of direct access terminals; however, it is this feature which represents the most critical security vulnerability as it could enable users to degrade performance. Specific safeguards and controls will be designed into computer hardware and software to preclude inadvertent or malicious acts that would deny full system utility and availabilty to potential users. In addition, the system will have programs and certain data files that must be protected against unauthorized access or modification. This will be accomplished through the implementation of security measures to control the functional capabilities of authorized users.

12.0 FINANCIAL

12.1 Purpose

The purpose of this section is to provide guidance for the financial planning required for the program. As such, it is a planning document and does not consititute a budgetary commitment on the part of the agency. All cost estimates are expressed in FY 1977 dollars.

12.2 Financial Planning

Guidance for the formulation and submission of administration budget requirements is contained in FAA Order 2500.10H dated August 2, 1976, "Call for Estimates - General Information and Policies (RIS: BU 2500-4)." Procedures in this directive provide for funding under 3 of the appropriations granted the agency as described below.

12.2.1 Research and Development

The estimates cover costs associated with:

a. In-house support of Model 2 development activities.

b. In-house support of Model 3 development activities.

c. Contract development activity required for Model 3.

12.2.2 Facilities and Equipment

These estimates cover all costs associated with the acquisition and installation of the Models 1, 2 and 3 Systems.

12.2.3 Operations

The estimates cover all costs associated with:

a. Providing positions necessary for the operation and maintenance of the Automated Flight Service Station System facilities and associated support.

b. Providing follow-on logistics support.

c. Providing leased communications facilities.

d. Operations and Maintenance training.

12.3 Regional/Aeronautical Center/NAFEC Facilities and Equipment Cost Estimates

The majority of Regional and Aeronautical Center and National Aviation Facilities Experimental Center costs will be associated with site preparation work, building costs, and other logistic support. Other costs will relate to engineering, installation, contract monitoring and testing management activities. The Regions, Aeronautical Center and National Aviation Facilities Experimental Center are to follow normal budgetary procedures in developing detailed cost estimates for each site scheduled to receive Flight Service Station Automation Program equipment. These cost estimates are to be prepared in accordance with Order 6011.4, "Facilities and Equipment Cost Estimates Procedures and Summary Handbook", on the basis of information contained in this program plan and any other special instructions issued. They are to be submitted through normal budgetary channels.

12.4 Program Cost Estimates

The cost estimates for Models 1, 2 and 3 are shown in Tables 12-1, 12-2 and 12-3, respectively. A funding summary for the complete program is shown in Table 12-4. A funding summary for only Phases A and B is shown in Table 12-5. The operations appropriations cost estimates for the total program are shown in Table 12-6. For planning purposes, the initial logistics support, on-site installation and checkout, and regional monitoring and engineering have been estimated to be 15 percent, 15 percent, and 5 percent, respectively, of the system hardware costs. The Facilities and Equipment funding plan by fiscal year shows the time the money is needed to fully fund projects, and procurement requests, and to fund subsequent years of multi-year funded procurements.

12.4.1 Model 1 Cost Estimates

Table 12-1 shows the estimated cost to contract for Model 1 engineering support, site preparation (Centers and Flight Service Stations), computer systems, software, documentation, and contractor provided training. Computer systems costs include computer hardware, data communications modems, specialist consoles, installation, testing, logistics and Regional contract monitoring and project engineering.

12.4.2 Model 2 Cost Estimates

Table 12-2 shows the costing for Model 2. The Facilities and Equipment cost estimates include contracts for engineering support, computer systems, software, documentation, and contractor provided training. Computer system costs include computer hardware, data communications equipment, specialist displays, installation, testing, logistics and Regional contract monitoring, and project engineering. Also shown are costs for Hub and Aviation Weather Processor buildings, National Airspace Data Interchange Network expansion and Radio Communications Control

TABLE 12-1

MODEL 1 COST ESTIMATES ($ MILLIONS)

(REFERENCE TABLE 12-5)

FACILITIES & EQUIPMENT FUNDING	77	78	79	80	TOTAL
ENGINEERING SUPPORT			0.6	0.5	1.1
AUTOMATION					
SOFTWARE			1.0	1.0	2.0
DOCUMENTATION, TRAINING, TEST				1.5	1.5
ACADEMY SYSTEM				0.4	0.4
NAFEC SYSTEM				0.4	0.4
FSDP SYSTEMS				5.7	5.7
SITE PREPARATION			2.0	1.8	3.8
TOTAL			3.6	11.3	14.9

TABLE 12-2

MODEL 2 COST ESTIMATES ($ MILLIONS)

R&D FUNDING	77	78	79	80	81	82	83	84	85		TOTAL
IN-HOUSE	1.1	1.1	1.2	1.7	1.7	1.2	1.2			SUBTOTAL FOR BALANCE	9.2
F&E FUNDING (PHASES A & B)											
ENGINEERING SUPPORT	1.2	1.7	2.3	2.3	2.2	0.5	0.5	0.5	0.5		11.7
AUTOMATION											
AWP SYSTEM (2)				2.7	0.5						3.2
AWP BUILDING (2)		0.7	0.7								1.4
DESIGN VERIFICATION & MODEL 2 SOFTWARE			8.0	16.0							24.0
DOC., TEST EQPT, TRAINING				6.3	1.1						7.4
ACADEMY SYSTEM				1.8	0.5						2.3
NAFEC SYSTEM(S) AND AWP				3.1	0.8						3.9
FSDP SYSTEM(S)				29.2	1.0	2.5	2.5	10.5	1.2		46.9
FSS/ARTCC SITE PREPARATION		0.6	3.9	5.2	0.7						10.4
NADIN		0.7	0.5								1.2
SUBTOTAL (PHASES A & B)	1.2	3.7	15.4	66.6	6.8	3.0	3.0	11.0	1.7	(REF TABLE 12-5)	112.4
CONSOLIDATED FLIGHT SVC STATIONS											
HUB BUILDING					0.6	0.6	6.7	15.3	15.3	23.2	61.8
SPECIALIST DISPLAYS								5.8	2.8		8.6
RELOCATION										11.3	11.3
RCCS NAFEC							1.0				1.0
RCCS ACADEMY SYSTEM							1.0				1.0
RCCS HUB SYSTEM							4.9	9.8	12.3	22.0	49.0
SUBTOTAL (PHASES C & D)					0.6	0.6	13.6	30.9	30.4	56.6	132.7
F&E TOTAL	1.2	3.7	15.4	66.6	7.4	3.6	16.6	41.9	32.1	56.6	245.1

TABLE 12-3

MODEL 3 COST ESTIMATES ($ MILLIONS)
(REFERENCE TABLE 12-5)

	77	78	79	80	81	82	83	84	85	TOTAL
R&D FUNDING										
IN-HOUSE	1.3	1.2	1.2	1.2	1.2	1.2	1.0	1.0	1.0	10.3
CONTRACTS	0.8	1.2	2.0	2.1	2.7	2.6	2.8	1.0		15.2
SUBTOTAL	2.1	2.4	3.2	3.3	3.9	3.8	3.8	2.0	1.0	25.5
F&E FUNDING										
MODEL 2/SOFTWARE ENHANCEMENT				1.1	1.1					2.2
VOICE RESPONSE SYSTEMS						10.5				10.5
SUBTOTAL				1.1	1.1	10.5				12.7
TOTALS	2.1	2.4	3.2	4.4	5.0	14.3	3.8	2.6	1.0	38.2

TABLE 12-4

COST ESTIMATES SUMMARY ($ MILLIONS)

	77	78	79	80	81	82	83	84	85	SUBTOTAL FOR BAL. OF F&E EXPENDITURES	TOTAL
F&E FUNDING											
MODEL 1			3.6	11.3							14.9
MODEL 2	1.2	3.7	15.4	66.6	7.4	3.6	16.6	41.9	32.1	56.6	245.1
MODEL 3				1.1	1.1	10.5					12.7
SUBTOTAL	1.2	3.7	19.0	79.0	8.5	14.1	16.6	41.9	32.1		272.7
R&D FUNDING											
MODEL 1											
MODEL 2	1.1	1.1	1.2	1.7	1.7	1.2	1.2				9.2
MODEL 3	2.1	2.4	3.2	3.3	3.9	3.8	3.8	2.0	1.0		25.5
SUBTOTAL	3.2	3.5	4.4	5.0	5.6	5.0	5.0	2.0	1.0		34.7
TOTAL	4.4	7.2	23.4	55.3	36.1	30.6	43.9	48.0	41.6	56.6	307.4

TABLE 12-5

AUTOMATED FLIGHT SERVICE STATION (PHASES A AND B)

COST ESTIMATES SUMMARY ($ MILLIONS)

	FY-77	FY-78	FY-79	FY-80	FY-81	FY-82	FY-83	FY-84	FY-85	TOTAL
F&E FUNDING										
MODEL 1			3.6	11.3						14.9
MODEL 2	1.2	3.7	15.4	66.6	6.8	3.0	3.0	11.0	1.7	112.4
MODEL 3				1.1	1.1	10.5				12.7
SUBTOTAL	1.2	3.7	19.0	79.0	7.9	13.5	3.0	11.0	1.7	140.0
R&D FUNDING										
MODEL 1										
MODEL 2	1.1	1.1	1.2	1.7	1.7	1.2	1.2			9.2
MODEL 3	2.1	2.4	3.2	3.3	3.9	3.8	3.8	2.0	1.0	25.5
SUBTOTAL	3.2	3.5	4.4	5.0	5.6	5.0	5.0	2.0	1.0	34.7
TOTAL	4.4	7.2	23.4	84.0	13.5	18.5	8.0	13.0	2.7	174.7

TABLE 12-6

OPERATIONS APPROPRIATION COST ESTIMATES ($ MILLIONS)

ITEM	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
A. OPERATIONS STAFF (AT)	103.7	103.7	108.3	108.3	108.3	108.3	108.9	109.3	109.3	109.3	107.3	98.4	90.2	83.0	73.8	66.4	59.9	54.7
B. MAINTENANCE STAFF (AF)	16.1	16.4	16.9	18.2	19.8	21.5	23.8	25.9	26.1	26.4	26.3	24.6	23.9	23.2	22.8	22.8	22.8	22.8
C. LOGISTICS SUPPORT	0.9	1.1	1.2	1.2	1.7	2.7	4.1	5.7	6.9	6.8	6.7	6.6	6.5	6.5	6.5	6.5	6.5	6.5
D. TRAINING (AT AND AF)	3.0	3.4	3.6	3.7	3.9	4.0	4.1	3.7	3.4	3.1	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8
E. LEASED COSTS COMMUNICATIONS AND FACILITIES	19.3	22.6	25.9	28.9	31.4	33.9	38.9	44.3	43.0	45.5	45.5	45.5	45.5	45.5	45.5	45.5	45.5	45.5
F. PERSONNEL RELOCATION AND RETIREMENT								0.4	1.1	1.2	0.4	0.5	1.7	2.6	2.1	0.5		
TOTALS	143.0	147.2	155.9	160.3	165.1	170.4	179.8	189.3	189.8	192.3	189.1	178.4	170.6	163.6	153.5	144.5	137.5	132.3

An explanation of the above cost estimates is provided on page 12-10.

Systems. The relocation item is the estimated cost to close 292 domestic Flight Service Stations. Costs also include Flight Service Data Processing Systems and Radio Communications Control Systems for systems support.

12.4.3 Model 3 Cost Estimates

The Model 3 costs are shown in Table 12-3. The Research and Development costs include in-house and contract efforts. The Facilities and Equipment costs include computer generated voice response systems and software enhancements.

12.4.4 Major Item Planning

The major items by fiscal year if multi-year contract is used:

FY-80 - 16 Model 1 Systems (14 sites, System Support Facility, Training Facility)

- 1 Model 2 System
- 1 Model 2 Software
- 1 Aviation Weather Processor
- Model 2 System one-time cost items
- Level III site preparation

FY-81 - 5 Model 2 Systems (as depicted below)

- 1 Model 2 System, including Aviation Weather Processor capability for System Support Facility
- 1 Model 2 System for Research and Development
- 1 Model 2 System for Training Facility with Aviation Weather Processor training capability
- 2 Model 2 Systems
- 1 Model 3 Enhancement
- Level III site preparation
- 1 Aviation Weather Processor

FY-82 - 6 Model 2 Systems

- Model 3 Enhancements

FY-83 - 5 Model 2 Systems

- Model 3 Enhancements

FY-84 - 4 Model 2 Systems

- Model 3 Enhancements

- 4 Radio Communications Control Systems, (System Support Facility, Training Facility 2 Hubs)

- 2 Hub Buildings

FY-85 - 2 Model 2 Systems

- Model 3 Enhancements

- 4 Radio Communications Control Systems

- 4 Hub Buildings

FY-86 - Model 3 Enhancements

- 5 Radio Communications Control Systems

- 5 Hub Buildings

FY-87 - Model 3 Enhancements

- 5 Radio Communications Control Systems

- 5 Hub Buildings

FY-88 - Model 3 Enhancements

- 4 Radio Communications Control Systems

- 4 Hub Buildings

12.4.5 Operations Appropriation Estimates

The estimated costs to operate and maintain the Flight Information Service System are shown in Table 12-6. These costs include the present system of 292 Flight Service Stations as well as the automated 20 Hub systems. The

Air Traffic Service and Airway Facilities Service staff costs assume a GS grade 10, step 4 and GS grade 11, step 3, respectively. Included in the personnel costs are 20 per cent benefits and 15 per cent overhead. The annual logistics support is 5 per cent of the Models 1, 2, 3 hardware cost. The Air Traffic and Airway Facilities training cost includes field and Academy training. The leased communications services (voice and data) and leased facilities costs include the current costs for the intercom/interphone systems and circuits, additional circuits for part timing of Flight Service Stations during 1978-1980, the addition of high speed data lines during 1979-1981, and the provision of automated call distributors, Pilot Automatic Telephone Weather Answering Service, and Fast File capabilities during the 1979-1985 period. The Hub communications costs and Hub maintenance costs are included in this item during the FY 83-95 time period. The last item in Figure 12-6 represents the estimated cost of personnel relocations and retirements.

APPENDIX A

DEFINITIONS

MODEL 1 (LIMITED AUTOMATION) -

A limited automation capability for the Flight Service Specialist to be implemented during Phase A of this program. Flight Service Data Processing Subsystems will be deployed in existing space within 14 of the current Air Route Traffic Control Center facilities, driving remote display terminals in the most active, Level III Flight Service Station facilities.

MODEL 2 (AUTOMATED FLIGHT SERVICE STATION SYSTEM) -

Model 2 system configuration characterized by 20 Flight Service Data Processing Systems at Air Route Traffic Control Centers which will provide information to remote specialist terminals at Level III Automated Flight Service Stations. Provides Program automation capacity for Model 3 Automation Enhancements and pilot self-briefing capability.

MODEL 2 (FLIGHT SERVICE HUB SYSTEM) -

Model 2 system configuration characterized by 20 Flight Service Data Processing Systems, 20 Flight Service Hubs, and an Aviation Weather Processor. Provides Program Phase C and D basic automation base for Model 3 Automation Enhancements and pilot self-briefing capability. Model 2 Flight Service Hub system to begin with 15th Model 2 Flight Service Data Processing System implementation. Flight Service Station consolidation into 20 Flight Service Hubs will begin in Phase C and be completed during Phase D.

MODEL 3 (ENHANCED SYSTEM) -

Program Phase B system configuration characterized by Model 3 features plus a Voice Response System, direct user access and pilot self-briefing capability. Voice Response System implementation will start as soon as practical.

FLIGHT SERVICE -

Flight information advisory services including pilot briefing service, flight plan service, aviation weather service (collection and dissemination), En Route Flight Advisory Service, Navigation Aid monitoring, Notices to Airmen, and emergency services.

TOTAL STAFFING AND STANDARD FLIGHT SERVICES -

A weighted sum of flight plans originated, pilot briefs and aircraft contacted used to calculate primary services staffing allowance.

FLIGHT SERVICE STATION -

Those 292 domestic facilities which currently provide services to the aviation community. A selected number of these facilities will be retained to provide continued service while the Flight Service Hubs are being established. Some Flight Service Stations will be provided full automation capability while others will continue in the manual mode of operation. All domestic Flight Service Stations will eventually be consolidated into the 20 Flight Service Hubs.

Classification	Annual Flight Services
Level I	Less than 100,000
Level II	100,000 - 400,000
Level III	More than 400,000

AUTOMATED FLIGHT SERVICE STATION -

Those Level III Flight Service Stations receiving automation in the Model 1 and Model 2 - Automated Flight Service Station systems.

FLIGHT SERVICE STATION SYSTEM -

That segment of the National Airspace System that is primarily responsible for providing flight services to the aviation user community.

FLIGHT SERVICE STATION AUTOMATION PROGRAM -

Agency program to effect planned improvements, consolidation, specialist automation, and direct user access capability for the Flight Service Information System.

FLIGHT SERVICE INFORMATION SYSTEM -

The Automated Flight Service Station System.

FLIGHT SERVICE HUB - (Hub) -

The new flight service facility collocated at the 20 domestic Air Route Traffic Control Center sites; they will ultimately be the focal point for all major flight service activity. The existing 292 Flight Service Stations will eventually be consolidated into the 20 Flight Service Hubs.

SERVICE A -

The domestic teletypewriter communications system used by FAA for the dissemination of aviation weather and NOTAM data.

SERVICE B -

Teletypewriter network used to distribute messages pertaining to Visual Flight Rule flights and to supplement Service F for certain types of Instrument Flight Rule flight movement and control messages. Also used for transmission of international flight safety messages between international Flight Service Stations.

SERVICE C -

Teletypewriter network used to collect and disseminate synoptic weather data, including upper air observations and weather map data, terminal and regional forecasts, and weather advisories.

SERVICE F -

System of telephones and radio-telephone circuits used primarily for flight movement and control messages.

APPENDIX B

ACRONYMS AND ABBREVIATIONS

A-BDIS	Automated (Service) B Data Interchange System
Acft. Mvt. Data	Aircraft Movement Data
AFB	Air Force Base
AFOS	Automation of Field Operations and Services (NWS)
AFTN	Aeronautical Fixed Telecommunications Network Program)
A/G	Air/Ground Communications
ARTCC	Air Route Traffic Control Center
AV-AWOS	Aviation Automated Weather Observation System
AWP	Aviation Weather Processor
DF	Direction Finder
DOD	Department of Defense
DOT	Department of Transportation
EFAS	En Route Flight Advisory Service
FAA	Federal Aviation Administration
F&E	Facilities and Equipment
FSDPS	Flight Service Data Processing System
FSIS	Flight Service Information System
FSH	Flight Service Hub
FSS	Flight Service Station
FY	Fiscal Year (October 1 through September 30)
IATSC	International Aeronautical Telecommunications Switching Center
IFR	Instrument Flight Rules

LF/MF	Low Frequency/Medium Frequency
Level III FSS	Manual FSS in the Highest Activity Group
LRCO	Limited Remote Communications Outlet
Met Data	Meteorological Data
NADIN	National Airspace Data Interchange Network
NAS	National Airspace System
NDB	Nondirectional Beacon
O&M	Operations and Maintenance
OST	Office of the Secretary of Transportaticn
PATWAS	Pilot Automatic Telephone Weather Answering Service
PSBT	Pilot Self Briefing Terminal
RCCS	Radio Communications Control System
RCO	Remote Communications Outlet
R&D	Research and Development
SFO	Single Frequency Outlet
TACAN	UHF Navigational Aid (omnidirectional course and distance information)
TSA	Total Staffing Allowance
TWEB	Transcribed Weather Broadcast
UHF	Ultra High Frequency
VFR	Visual Flight Rules
VHF	Very High Frequency
VOR	VHF navigational aid which provide omnidirectional course information (VHF omnidirectional radio range)
VORTAC	Collocated VOR and TACAN (VHF and UHF course and UHF distance information)
VCS	Voice Communications System
WATS	Wide Area Telecommunications Service